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Progress in Boiler, Tank and Plate Shops

Some of the New Methods Introduced and Improved and Special Equipment Utilized in Well Organized Shops to Increase Output

BY C. A. TUPPER

It is a noteworthy fact that, while every possible effort has been made toward improving the equipment of machine shops and increasing their operating economy, this gain has not been attended by corresponding progress in the work of the ordinary boiler, tank or plate shop, apart, of course, from the manufacture of large water tube boilers and some of the high grade tubular boilers, which is a line of production in a class by itself.

Within the past year or two, however, a change has been observable in the attitude and methods of the men responsible for the operation of such shops, and many new ideas are being developed. Perhaps it is incorrect to say "new," for most of the ideas have heretofore been carried out somewhere; but the effect on the industry as a whole is the same. Recent tendency has been to gather up these isolated examples of improved methods and make them more general in their application. This is due, for the most part, to four principal causes, such as gatherings of superintendents and foremen at conventions, where experiences have been interchanged; exchange of visits among plants; suggestions made in the advertisements and printed matter of manufacturers of boiler shop equipment or carried from place to place by their salesmen, demonstrators, erectors and others, and the exigencies of repair work, particularly in railroad shops.

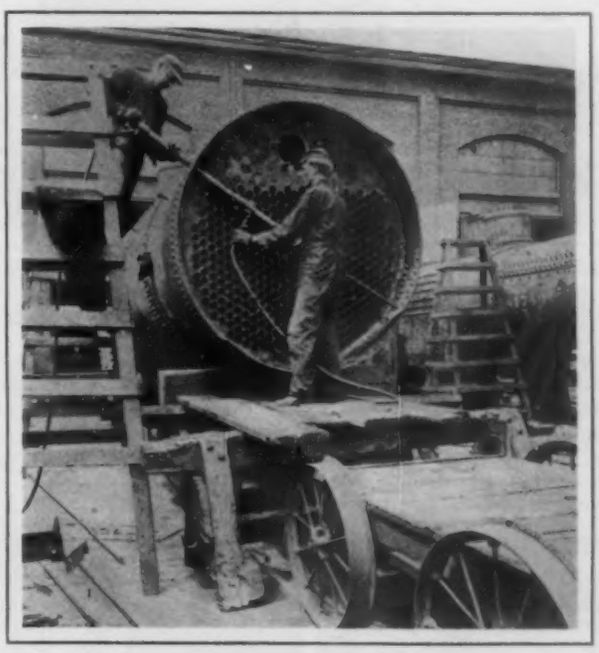


Fig. 1—An Adaptation of a Staybolt Driver as a Holder-On for Use Close to a Sheet Where an Ordinary Holder-On Cannot Be Employed

The photographs reproduced herewith show applications of tools in locomotive boiler, firebox, tank and tender work, where some of the most ingenious, time-saving methods have been introduced. Fig. 1 is an adaptation of a staybolt driver as a holder-on, for which purpose it drives up to the head of the rivet and is used in a position close to the sheet, to which an ordinary holder-on is not adapted. Fig. 2 shows a self-supporting device made on the same principle as the staybolt driver and pneumatic holder-on just referred to, and Fig. 3 illustrates its use in combination with an ordinary pneumatic hammer. Fig. 4 shows a special tool, which in this case is arranged for knocking off the heads of rivets from a firebox, the record made at the time the photograph was taken being 430 ⅞-in. rivets per hr.; and in Fig. 5 it is set for punching them out. Fig. 6 illustrates an adaptation of a somewhat similar tool for holding on and driving up mud drum rivets, and in Fig. 7 it is shown putting in firebox flue sheet rivets for an oil burning engine, these rivets being driven flush with the inside. The same view displays a rivet buster attached to a yoke, as used for removing the burrs from wrapper sheets. A feature of this photograph is also the self-supporting crane, the jib of which is swung from a portable structural column and used for holding up the tool. This support can be set down anywhere by one of the shop cranes and used for holding up a great variety of pneumatic tools. Its base can be seen directly back of the operator. The above described photographs were taken in the shops of the Southern Pacific Company, at Los Angeles, Cal., under the direction of Supt. D. P. Kellogg, who is in charge of the work there.

This ingenuity in the use of small tools has been carried into larger work. At one of the principal heavy plate shops of the country the writer found many special devices. Spacing tables for accuracy and speed in punching large sheets are no longer a novelty; but at this plant there is one designed by the superintendent which is believed to be the largest of its kind and possesses a number of unique features. This is so constructed, with automatic adjustments, that a single operator is enabled to set, regulate the spacing and punching and otherwise handle the heaviest plate that can be put upon the table. Sheets weighing as much as 7000 lb. have been punched here, and the one man assigned to the work has been ample for all requirements. At the time of the writer's visit this spacing table was arranged for punching out three notches, 2 x 6 in., on each side of a heavy plate. Twelve binding bolt holes, ⅝ in. in diameter, were also to be punched, one on each side of the six notches. These plates, as it subsequently developed, were set, notched and punched on both sides of the sheet at a rate slightly in excess of 20 per hr. With this table the ordinary sawtooth rack movement is replaced by one involving a steel templet, which, together with its locking

pins, will accurately space any layout within the scope of the table. These templets can, of course, be designed to cover an extremely wide range of work; they are quickly and accurately made and but little time is required to attach any templet to the table. The design and arrangement of the table are such that the only limit to the size of the plate to be punched is the room available in which to operate. For example, sheets 30 ft. in length and ¾ in. thick, that are punched for ⅞-in. rivets in one, two or four rows, can be handled as readily as the smaller sizes. The table is built almost entirely of structural shapes, the only cast iron used being the spreaders and stools for carrying the beams or rails. This style of construction not only gives a very light table but also one of considerable flexibility, which will yield to the weight clamped upon it without impairing the accuracy of the work to be performed.

In numerous shops throughout the country a marked distinction is beginning to be made between the requirements of heavy, slow punching and those of light, quick work. For the latter purpose especially designed rapid production machines, capable of both regular and irregular punching, will soon be as common, relatively speaking, as tools, serving similar purposes in machine shops. The same is true of bending rolls, straightening machines and shears, necessitating for the larger shops a more comprehensive line than formerly, although with these tools the distinction referred to has always been made to a greater extent than with punching machines. In the speed and efficiency of each the arrangement of the drive, particularly by geared or direct-connected motor, has much to do.

Fig. 2

Fig. 3

Figs. 2 and 3—A Self-Supporting Holder-On and the Way It Is Used in Conjunction with a Pneumatic Hammer

For all cold-cutting outside of plate shearing an interesting development is the rapidly growing use of high-speed friction saws, the cutting blades of which are usually mounted directly on the shafts of motors especially designed for this class of work. This limits the speed to that of the motor, in each case, but by gearing the saws can be brought up to any speed. The method is coming more and more to be regarded as the most economical yet devised, both from the standpoints of speed and kerf and also of the effect on the material; so that it promises to become general.

On the subject of drilling operations in plate, tank and boiler shops an extended treatise might be written; but in general it may be said that machine shop methods are being everywhere successfully introduced, notwithstanding many essential differences in conditions. The use of multiple head group or radial drilling machines, with the spindles of the former and the saddles and columns of the latter so designed as to admit of any spacing between centers or of irregular spacing, is, however, one feature which has been carried even farther in plate shops than in machine shops, owing to the more varied need of drilling in even or staggered rows or peculiar formations.

For holding the work, in drilling along circular, elliptical or other arcs, there has also been developed the magnetic "old man," which is ordinarily a home-made device that shows considerable ingenuity and varies with the requirements of the shop. One of a portable type seen by the writer in a manufacturing plant where plate work is handled was the invention of the foreman in charge. This device is made of two channel bars held together with suitable braces and provided with three round iron legs. Inside of the channel bars, and mounted on wheels, is a carriage which permits of an easy movement of the drill back and forth. A pneumatic drilling machine is suspended on a spindle in the center of this carriage and is raised or lowered by a simple lever. The frame swivels freely around the upright from the magnets, thus allowing work to be done in a complete circle or, by adjusting the radius, in any curved or irregular formation. The holding power of the magnets can be regulated, up to the capacity given by their winding, to suit the work to be done; and there is practically no limit to the size of the work that can be handled with apparatus powerful enough. For countersinking and light drilling the lever feed answers the purpose, but by substituting a regular screw feed heavy drilling can be done.

Tools used in some shops include drilling and threading and reducing machines especially for staybolts and similar work, together with the ordinary bolt threading, cutting and pointing machines used for odd lots not carried in stock. Furthermore, tools common to machine shops, such as slotting, shaping and even milling machines, are coming into more extended use, and a noteworthy tendency is the introduction of planing machines for truing the edges of heavy plates. Other machine work on frame supports, rods, heads, etc., is usually done in a regular shop for that purpose forming part of the same plant, failing which a small auxiliary machine and tool shop is maintained. Simple grinding, cutting-off and threading operations are taken care of as may be most convenient.

Riveting apparatus, from the small pneumatic hand tools to the huge hydraulic gap riveters, has been steadily improved in efficiency, enabling operations to be gradually speeded up, but there have been no recent developments of special interest. Among the larger machines an example of the best practice is a type of hydraulic riveter, seen by the writer in several locomotive shops, which is designed to handle entire boilers, with firebox tops, tanks and tenders, complete. One of these has, for example, a depth of gap of 14½ ft. and a width of gap of 54 in. The maximum pressure capacity, at 1500 lb. exerted by the pump, is 125 tons; but, by a special system which has been worked out for this class of riveting, multiple pressures of varying degrees, say 25, 50, 75, 100 or 125 tons, can be exerted, depending upon the size of the rivet and the work to be done. The head of the riveter is flush, which permits work to be swung in; and, as the bottom of the ram is also flush, there is no limit to the size of the boiler, tank or plates to be riveted. The width of the gap also enables fireboxes to be swung clear and, with the flush construction of the ram, to be riveted into place. A hydraulic crane

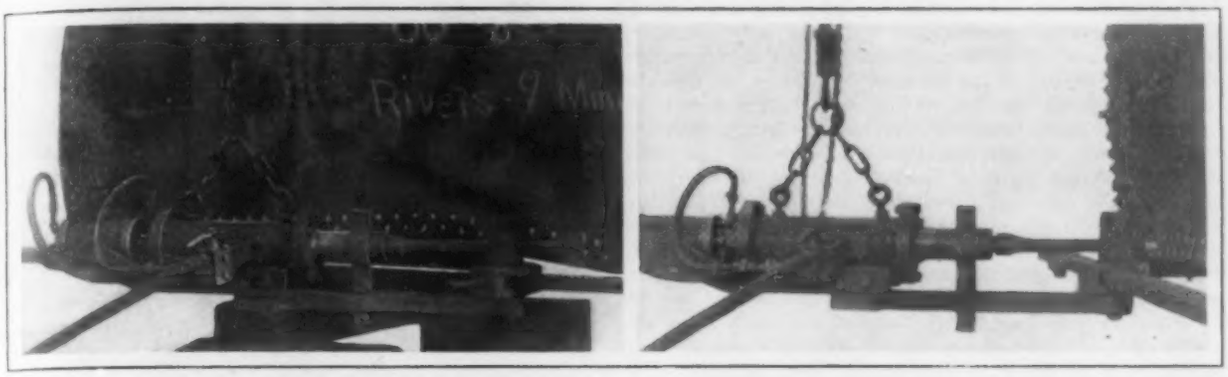


Fig. 4 Fig. 5

Figs. 4 and 5—A Special Tool in Use for Cutting Off Rivet Heads and Also for Punching the Rivets Out

for holding the work forms part of the equipment. This is of 20-tons capacity and also operates under 1500-lb. pump pressure. A separate operator for this is dispensed with by chains conveniently suspended for the movement of the bridge and trolley.

A feature of riveting work on the shop floor or about the yards is the increasing use of portable rivet heaters. Each of these is ordinarily self-contained, carrying a sufficient supply of oil for the day's work, and can be rolled about into any place where a small truck will go. The heating capacity of such a furnace is usually about 400 ¾ or ⅞ in. rivets per hr., and the apparatus can be operated on any of the various shop pressures on the compressed air lines. By reducing valves, however, the air pressure on the oil tank is always kept low, overcoming any danger of explosions. If the air hose is accidentally cut or punctured, as, for example, by being jammed against some sharp plate edge or corner in the shop, the oil immediately drains back to the tank, killing the fire and avoiding any accident.

In contrast to the steady but comparatively uneventful advance of riveting has been the more rapid gain of flanging and welding in boiler, tank and plate shop work—more rapid because of the ground that had to be made up. Flanging of heavy plates is a subject to which, except in a desultory fashion, very little attention has been paid in years past. Manufacturers have usually accepted it grudgingly as a necessity along certain lines, but to be avoided wherever possible. The expensive machinery needed for first-class results, including flanging presses, flange clamps and flange punches, has further militated against this work. Notwithstanding all obstacles, however, the use of both hot and cold flanging has, within the past two or three years, grown by leaps and bounds. This is due to the greater strength of construction required by higher pressures and temperatures; and, as in the case of steel castings, manufacturers are turning largely to outside custom plants having special facilities for flanging. The same is true, to a considerable extent, of dishing and other forms of regular and irregular hot pressing. As, however, each of these subjects calls for special, comprehensive treatment by itself, no attempt will be made here to do more than call attention to their importance.

In the case of difficult work, and where strength of construction is a material factor, welding has been resorted to as an aid to flanging. One job observed by the writer, which will serve as an illustration of this tendency, consisted of heavy water jacket plates for a smelting furnace, the flanges of which were very wide, with the corners turned nearly square. There was altogether too much stock at these corners to bend and press them into the necessary shape entire, and therefore autogenous welding was resorted to as an aid to the flanging operation, the stock at the corners being cut away and V-shaped pieces welded in. Another job consisted of a large sheet steel blast pipe, which required for its construction a number of angle irons of special shape. To make these angle irons two pieces of sheet steel were cut out and welded together at the corners. This method of making the angles proved to be not only better but cheaper than the older system. For heavy, irregular shaping and flanging a practice borrowed from naval construction is the use of marine bending floors, which in a few of the larger plants are very effectively utilized.

In handling flues and tubing for boilers, condensers and other purposes, combination pneumatic machines for swaging, scarfing and welding have been introduced in many shops. With one of these a 2-in. flue, for instance, can be swaged and welded in about 5 sec., making a smooth weld both inside and out and leaving the flue an even thickness. A rotary flue welder is also being successfully used.

Furnaces for annealing, flanging, hot-pressing and the heating of rivets, tubing and other stock continue to be mainly of the oil and gas-fired types; but the use of powdered fuel threatens to make heavy inroads on this practice. In the burning of oil an improvement brought about in many installations, as observed by the writer, is in having it take place entirely within the combustion chamber, outside of the heating area proper. Here, at the bottom, the oil is broken down to the hydrocarbon gases, which at

Fig. 6 Fig. 7

Figs. 6 and 7—A Device for Holding On and Driving Up Mud Drum Rivets and Putting in the Flue Sheet Rivets on a Firebox

the top of the chamber come in contact with the air necessary to complete combustion. This not only simplifies the process and makes it more efficient, but also increases the hourly capacity of the furnace, due to the fact that the thermal value of the fuel is immediately effective upon crossing the bridge wall into the heating area proper.

The blower systems installed with furnaces and elsewhere in shops show a marked advance in operating economy and efficiency over those of only a few years ago. Motor drive is now general, and some very ingenious systems of automatic electrical control, including manipulation from some central point, have been worked out. In contradistinction, also, to the former practice of setting up a blower anywhere, often back of a rubbish heap, the tendency now is to build an entirely separate compartment for it, with an ample intake supplied with pure air.

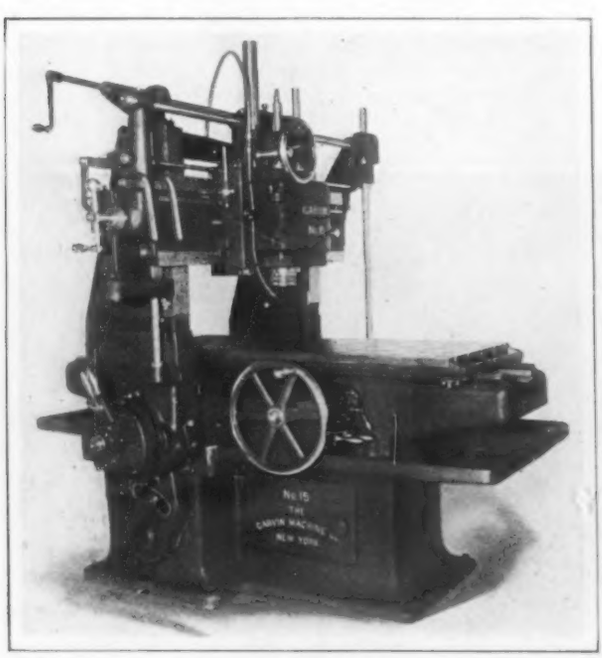
There are, in fact, improvements all along the line. The most gratifying feature of the year just closing, so far as boiler, tank and plate shops generally are concerned, is the fact that the apathy and indifference of former times seem to have been definitely shaken off. Real progress has been apparent lately, and much more will unquestionably be made in the near future.

Special Feed Vertical Milling Machine

The Garvin Machine Company, Spring and Varick streets, New York City, has recently placed on the market a vertical-spindle milling machine, having an accelerated feed in either direction for both the table and the cross slide and a self-contained drive. Among other points of interest is the means for changing the back gears, a vertical adjustment of the spindle slide with micrometer stops and binder handles, a change feed box with means for reversing the feed, centralized control of all movements and the protection of gears.

The cone pulley driving the machine is carried by a bracket on the base of the machine, and is connected by splined shafts to the spindle. It is pointed out that this arrangement facilitates the application of motor drive, it being possible to transmit power from a motor bolted on the base to the cone pulley shaft by a silent chain. The power is applied through bevel and spur gears to the prolongation of the upper ends of the spindle and the back shaft. It is possible to drive the spindle directly at high speeds or through the back gearing at slow speeds by simply shifting one gear, the direction of rotation in each case being the same. The nose of the spindle is 3¼ in. in diameter and is threaded with a 3½-pitch left hand thread to take a Brown & Sharpe No. 24 cutter, the power being sufficient to enable a cutter 12 in. in diameter to be handled.

The table movement is by a Sellers motion of an oblique worm having a ball thrust bearing and controlled by a pilot wheel. Both the table and the cross slide are fitted with double feed boxes, giving the regular and a very fast feed at will. A separate handle is provided for throwing in each kind of feed, which is controlled by dogs on the table and the cross rail in the customary way. There are two sets provided. One set permits the feed to be tripped in either direction and brings the part up against a solid stop, while the others are buttons which trip but permit of passing over. The same handle on the cross slide rail throws in and trips the feed. The fast and regular feeds are in the same direction, so that it is possible to make quick jumps over intervening spaces between cuts. To prevent both kinds of feed from being thrown in at the same time, an interlocking arrangement is provided. A turn of the change feed handle throws the change box out of action and when this is done a special lever on the box can be operated to traverse the table or the cross slide back and forth rapidly by power. To prevent accident, this lever is interlocked with the change box.



A New Vertical Spindle Milling Machine Having Two Groups of Feeds for the Table and the Cross Slide

Labor Legislation Pending in Congress

The National Council for Industrial Defense, 30 Church street, New York, calls the attention of employers to a bill now being urgently pressed upon Congress by the Federation of Labor which embodies in one enactment all the various proposals to relieve labor organizations from civil or criminal responsibility and judicial interference that have been severally pushed in recent years. The bill in question is H.R. 1873 and S. 927, identical measures, introduced in the House by Representative Bartlett and in the Senate by Senator Bacon, both of Georgia. The Federation of Labor indorsed this measure in its conventions of 1912 and 1913; instructed its executive committee to procure immediate enactment without change; through that committee has presented these demands to the President and Congress, and now by circular appeal is asking for the organization of committees of union men to wait on senators and congressmen in each State in the coming holidays and is urging the sending of individual letters to representatives demanding the immediate passage of the measure without alterations.

The National Council for Industrial Defense states that "never before has it been proposed in this country or elsewhere that the right to be protected against a combination or a conspiracy depends upon the class to which the conspirators belong and not the acts which they agree to do or actually accomplish." The proposed act is characterized as "vicious class legislation, which undertakes to make it lawful and right for laborers or farmers to combine and do things to better their condition that remain crimes and conspiracies if done by merchants to increase the price of their goods or manufacturers to fix the price of their wares."

Increase in France's Pig-Iron Capacity

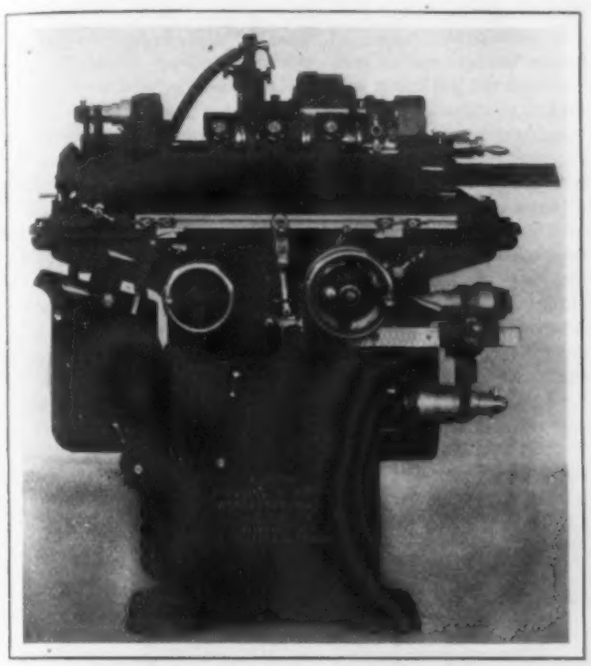
Because of present and projected improvements in iron and steel works, France's output of pig iron is expected to be increased by 1,500,000 tons in the next three years. The Aciéries de France will replace the two small blast furnaces at their Isbergues Works (Pas de Calais district) by two others of larger capacity for the production of Thomas pig iron. The Forges du Nord et de l'Est have recently installed a third blast furnace at their new works at Valenciennes. The Forges de Anzin contemplate the erection of two blast furnaces, and toward the end of 1914 the new works at Pont à Vendin of the Lens-Commentry-Four-Chambault firm, equipped for a yearly output of 300,000 tons of pig iron, will start operations. In the eastern district the construction of three new units at the Homecourt works and the reconstruction of the seventh blast furnace at the Moulaine works are planned. According to a recent report of the Chief Mining Inspector, there are at present 111 iron ore concessions in the Department of Meurthe and Moselle, of which 56 are working. The total production in 1912 was 17,000,000 tons, against 14,800,000 tons in 1911.

The Minneapolis, St. Paul & Sault Ste. Marie Railroad Company is making preliminary surveys for the proposed new ore dock at Ashland, Wis. The present dock will also be improved and a new roundhouse constructed.

A New Norton Plain Grinding Machine

A 3x18 In. Tool Possessing a Number of Interesting Mechanical Features

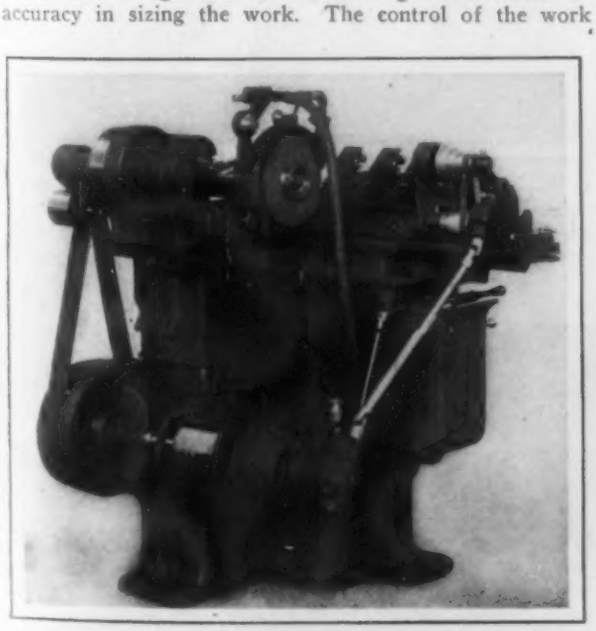
The 3 x 18 in. plain cylindrical grinding machine brought out by the Norton Grinding Company, Worcester, Mass., is especially useful in tool work and for such tasks as



Front View of a Recently Developed Plain Cylindrical Grinding Machine

grinding small twist drills and parts of typewriters, sewing machines, phonographs, cream separators, roller bearings and electrical apparatus. It is made to swing 3 in. in diameter to give room for suitable steady rests for supporting work from ⅛ to 1 in. in diameter, and up to 18 in. in length, but is best suited for work under ½ in. in diameter. It is designed for finishing cuts only, where there is not more than from 0.004 to 0.008 in. of stock to be removed from the diameter of the work.

The machine is self-contained, no overhead works being required. It can be driven by belt either from above or below, or by a motor placed on the floor at the back. The table reverse is pneumatically cushioned, making it possible to operate the table at a maximum speed of 27 ft. per min. Eight table speeds are provided, the slowest being 17 in. per minute. The automatic and hand cross feeds are of new design and sacrifice nothing in the matter of accuracy in sizing the work. The control of the work



View of the Left Hand End of the Machine

revolution and table traverse is unique in that while either can be started separately or simultaneously, the stopping of the work always stops the table, which cannot be started unless the work is revolving. The act of stopping the table connects the handwheel for moving the table by hand, and this is disconnected when the table is started. The table is of new design in that the foot stock covers the dovetail ways on which it slides, protecting them from dirt and injury. The steady rests, designed especially for small work, are provided with micrometer stops, and are arranged for quick handling. The workshoes are of steel, hardened and ground. Four work speeds are provided, ranging from 160 to 640 r.p.m. The wheel spindle is a chrome-nickel forging, carefully heat treated. The shafts are self-oiling and the loose pulley runs on a self-oiling roller bearing. The footstock spindle is hardened, as also are many other parts of the machine, insuring maximum wearing qualities. Ample provision is made for lubricant on the wheel and work, and the settling tank is conveniently arranged for cleaning. The machine carries wheels 10 in. in diameter, with a ¾-in. face. Tapers up to 2 in. per ft. can be ground.

Two wheels are furnished, one for the grinding of soft and tool steel, and the other for cast iron and hardened steel. The equipment includes a center grinding attachment, arranged to grind the center points perfectly round,

Right Hand End View

true and to 60-deg. included angle. If a different angle is required, a special attachment will be made to order. The weight of the machine, complete with all equipment, is about 1800 lb.

Lord & Taylor's new store in New York City, now under construction, is to be equipped with Buffalo heating and ventilating apparatus and Carrier air washers and humidifiers, this apparatus constituting one of the largest contracts of its kind placed in 1913. There are to be 64 fans, all driven by direct-connected motors, the sizes and speeds being selected with special reference to noiseless operation. Of these fans, 25 are to be of the Conoidal multiblade type, and the remainder will be cone fans and propeller wheels. Eleven Carrier air washers will clean and humidify the incoming air, each washer being equipped with the Carrier system of automatic humidity control.

The Clyde shipbuilding returns for the year 1913 will prove the best on record. It will be the third consecutive year of prosperity at the Scotch shipyards.

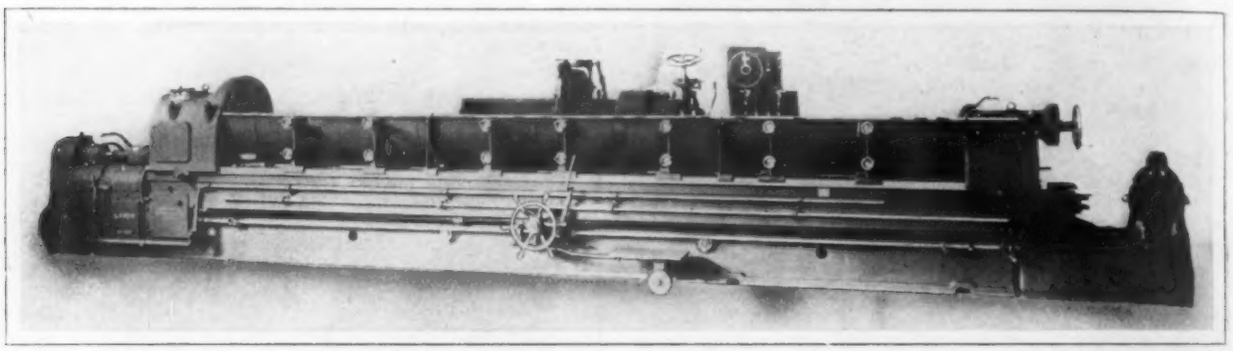
Large Motor-Driven Grinding Machine

A Manufacturing Tool for Handling Shafts and Other Work Up to 20 Ft.

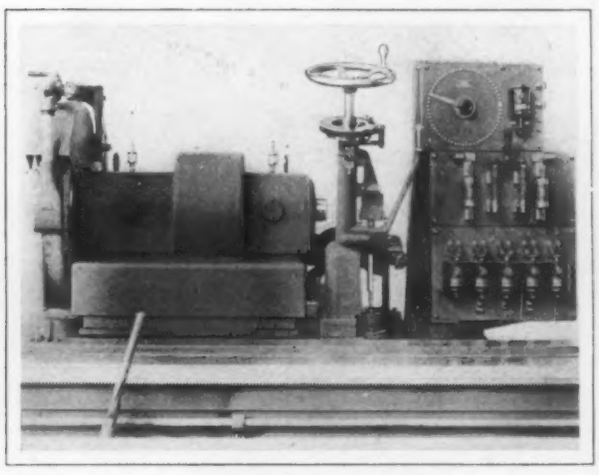
The Landis Tool Company, Waynesboro, Pa., has completed a large motor-driven plain grinding machine, which is intended as a manufacturing tool for handling work up to a maximum diameter of 30 in. and a length of 20 ft. In addition to grinding large shafts, it can also be used for the finishing of heavy rolls and engine crank and other shafts. A number of motors are used for driving various parts of the machine, some of them mounted on separate carriages. Three motors are used for driving the machine. One is for driving the grinding wheel, one for revolving the work and traversing the wheel and one for operating the water pump. The second of these motors is belt connected with the gear box at the end of the machine, which is arranged with a clutch mechanism, so that it is possible to start and stop the drives, either singly or together, without reference to the motor. This motor operates at a constant speed, and changes in the speed of both the work and the traverse of the wheel are made by an arrangement of gears and clutches, all of which are operated from one position at the front of the machine. In all, there are 16 different work speeds, ranging from 2 to 45 r.p.m. and 10 changes of wheel traverse speed, from 2½ to 84 in. per min.

The grinding wheel is driven by an adjustable-speed motor, which is controlled by a set of apparatus mounted on the main wheel carriage. The standard size of wheel used with this machine is 30 in. in diameter and can be reduced 8 in. in diameter before it must be discarded. The proper peripheral or cutting speed is secured for any size within the range of wear of the wheel by manipulating the controller. As will be noticed from the rear view of the grinding wheel, the motor is mounted upon a separate carriage and travels on a track formed by the base of the machine. The two carriages are entirely independent, except for an arm connection for propelling the motor carriage as the wheel carriage is traversed. The motor carriage is mounted on large diameter rollers, which are fitted with ball bearings. Metal guards are provided to protect the track surfaces upon which the carriage travels. Sliding contact shoes and feed wires, located along the body of the machine, are used to transmit the electric current to the grinding wheel motor. A metal guard is provided to protect these wires and prevent anything from falling on them from directly above.

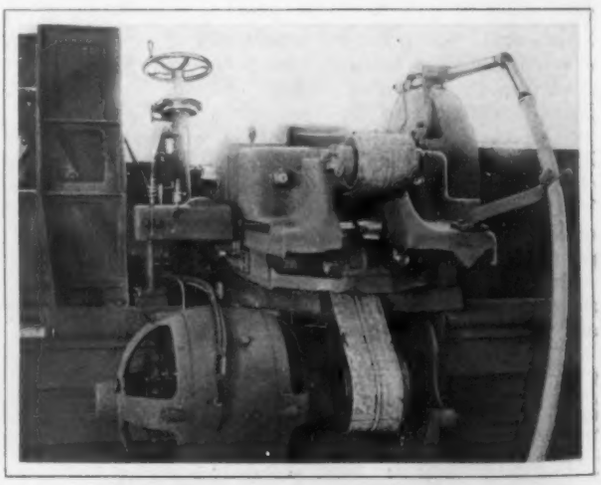
The grinding wheel slide for feeding the wheel toward



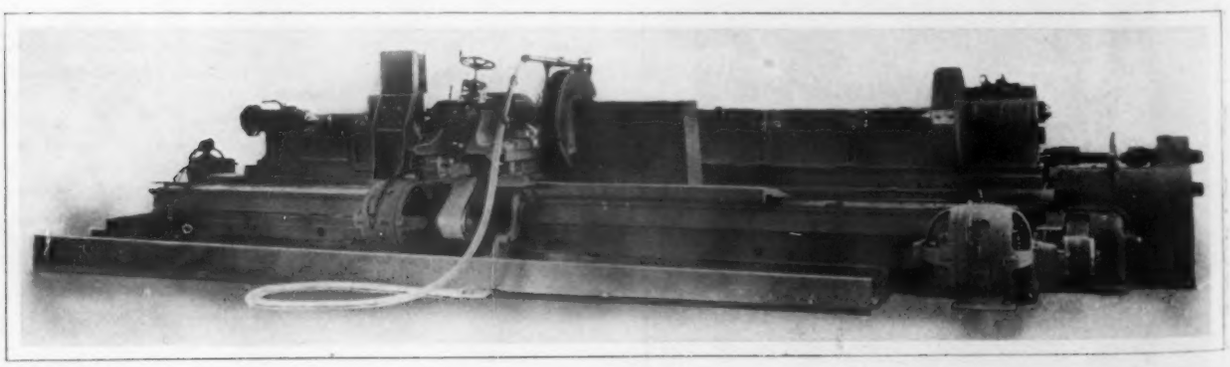
Front View



Front View of the Grinding Wheel Head



The Grinding Wheel Drive from the Rear



Rear View

FOUR VIEWS OF A NEW LARGE PLAIN GRINDING MACHINE WITH SPECIAL MOTOR DRIVE

and away from the work has a rapid mechanical feeding mechanism, which is operated by a vertical lever located between the handwheel regulating the feed and the motor controller, this arrangement being clearly brought out in the front view of the grinding wheel head. This mechanism is employed for moving the wheel back from the work quickly while changing from one piece to another or from one portion of a piece to another, where there are several diameters to be ground and also for returning the wheel rapidly to the grinding position. The action of the controlling lever is the same as the direction of motion of the wheel, the lever being pushed toward the work to feed the wheel in and moved back when the wheel is to be taken away from the work. In addition, the customary hand feed is provided, together with an automatic arrangement for feeding the wheel at the reversing points.

An automatic motor starter and field rheostat is used for controlling the motor. Emphasis is laid upon the fact that this gives an efficient arrangement, since the controller can be set to give the wheel the proper feed for any size of diameter within the wearing range and the motor operated by an ordinary knife switch. Positive control of operation is claimed for this arrangement, since with the automatic starter the speed gradually increases after the starting switch has been closed. Bronze is used for all the spindle bearings which run continuously while the machine is in operation, and the spindles themselves are of hardened and heat treated steel. The starting box of the water pump motor is mounted directly upon the motor itself, an arrangement which, it is pointed out, will be found convenient for the operator. The starter for the work driving and grinding wheel traversing motor is not shown, the location of this varying in accordance with the desires of the customer when the machine is installed.

Joint Engineers' Meeting in New York

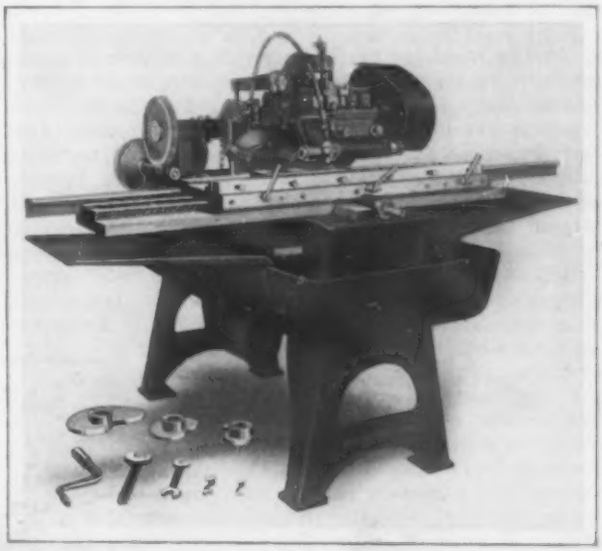
The American Electrochemical Society, New York Section, of which H. B. Coho is secretary-treasurer, 111 Broadway, New York, announces that the next meeting will be a joint one with the American Institute of Electrical Engineers and the New York members of the American Society of Mechanical Engineers, on the evening of Friday, January 9, in the auditorium of the Engineering Societies Building, 29 West Thirty-ninth street, New York. Dr. C. O. Mailloux, president of the Electrical Engineers, will preside. After the meeting the members of the section will be the guests of the American Institute of Electrical Engineers at a smoker to be held in the rooms of the Institute. The subject to be discussed is "The Power Problem in the Electrolytic Deposition of Metals." Lawrence Addicks, superintendent United States Metals Refining Company, will speak on "The Limitations of the Problem"; H. E. Longwell, mechanical engineer, Westinghouse Machine Company, on "The Mechanical Side of the Problem"; F. D. Newbury, division engineer, Westinghouse Electric & Mfg. Company, on "The Electrical Side of the Problem."

The Wisconsin Manufacturers' Association has re-elected its officers. Harry W. Bolens, president Gilson Mfg. Company, Port Washington, is president; A. Hirshheimer, president LaCrosse Plow Company, vice-president; William George Bruce, Milwaukee, secretary; Frank J. Sensenbrenner, Neenah, treasurer; James A. Fetterly, Milwaukee, assistant secretary and treasurer. The directorate includes George Ingersoll, Beloit; A. L. Osborn, Oshkosh; Frederick Robinson, Racine; C. A. Johnson, Madison; D. P. Lamoreaux, Beaver Dam, and Gen. Otto H. Falk, president Allis-Chalmers Mfg. Company, Milwaukee.

The General Electric Company, Schenectady, N. Y., has sold to the Chase Rolling Mill Company, Waterbury, Conn., a 750-kva. alternating-current generator; to the Eastern Metals Corporation, Bayonne, N. J., a 370-kva. motor-generator set with blower equipment and switchboard; to the Standard Steel Car Company, New Castle, Pa., 54 motors ranging from 5 to 50 hp.; to the Union Iron Works, San Francisco, Cal., four 200-hp. induction motors with starting compensators; to the United States Aluminum Company, Pittsburgh, Pa., ten 20-hp. induction motors with starting compensators.

Machine for Cutting Racks Automatically

An improved type of automatic rack cutting machine for handling work up to 30 in. in length has been brought out by the Standard Mfg. Company, Bridgeport, Conn. In addition to cutting racks, it is also possible to convert the machine so that gears may be cut. The various special



A New Automatic Machine for Cutting Racks Up to 30 In. Long

features of this company's line, such as the quick return of the cutter, the raising of the cutter clear of the work for the return stroke which permits indexing to be done during the return stroke, the locking of the index plate and the quick changing of the amount of index, have all been embodied in the construction of this machine.

The machine has a deep oil pan, mounted on low substantial legs, with detachable wings. It is pointed out that this pan, in combination with the oil pump, insures a large flow of oil on the cutter, without waste due to splashing or overflow. The cross rail is keyed to the table and is fastened in position by set screws and braced underneath. The vise has long bearings with a gib on the inside to compensate for wear. There is an adjustable steel jaw running the entire length of the vise for holding the racks, saws, or other work that is to be cut. The vise also carries a rack at the front throughout its entire length, which engages with a crank operated pinion for returning the vise after the work has been completed. An automatic adjustable trip provides for the throwing out of the feed when the work is completed.

A large bearing is provided for the cutter spindle and an overhanging support for its outer end is relied upon to eliminate vibration and secure accuracy. Vertical and horizontal adjustments controlled by screws are provided for the slide carrying the cutter spindle, with a micrometer adjustment for accurate gauging of the depth of cut. The equipment of the machine includes four-stroke cams for ordinary work and special stroke cams for special jobs.

The Nordberg Mfg. Company, Milwaukee, Wis., is preparing for shipment to a Canadian mining company a special air compressor, 18 and 30 x 36 in., variable capacity, two-stage, and a 23 and 23 x 48-in. geared duplex air hoisting engine. Their completion has required nearly six months, the entire work being on special patterns and designs. The Nordberg Company only recently invaded the Canadian field in competition with British manufacturers, and several large contracts are in prospect for delivery during the first half of 1914.

As a result of the work of the corrosion committee of the Institute of Metals, London, England, the ordinary 70:30 tube of commerce has been shown to be far surpassed in resistance to dezincification by tubes containing 70 per cent. copper, 28 per cent. zinc and 2 per cent. lead, and by those known as "Admiralty," having 70 per cent. copper, 29 per cent. zinc and 1 per cent. tin. Muntz metal, 61 per cent. copper and 39 per cent. zinc, has been found unsuitable.

Intricate Forms of Cast Iron Explained

The Guesses Made on How the Intricate Shapes Were Obtained and What the Actual Method is, with Its Latest Results

In *The Iron Age* of November 13 a number of photographs were reproduced of gray cast iron in the form of delicate vines, leafy shrubs and what might be called Japanese carvings. It was explained that these were reproduced not only because they would prove interesting in themselves, but because readers might like to offer an explanation for them or suggest the procedure necessary to get the results. The iron formations were made by Alexander E. Outerbridge, Jr., metallurgist of William Sellers & Co., Inc., Philadelphia, who has recently obtained some unusually striking examples of the fantastically shaped cast iron. Some of these are shown in the accompanying illustrations and Mr. Outerbridge describes the method of their production.

Some guesses have been made by readers of *The Iron Age*, and indeed one of these suggested a process substantially the same as that followed by Mr. Outerbridge, lacking one important feature only. Interesting details of these contributions and also of explanations made by others directly to Mr. Outerbridge, have also been compiled here. It will be recalled that mention was made of the fact that some of the tendrils, if the finest parts of the cast iron may so be called, are so slender and so springy that, if touched, they vibrate for minutes at a time, sometimes responding to ordinary tremors in a room. Some of the formations, in fact, were so delicate that care was needed to prevent breakage.

CAST IRON IN INTRICATE FORMS

The Hight of the Tree-like Result in the Middle May be Apprehended by the 2-ft. Rule Shown. About 8 in. of the Lower Part is Concealed in the Box, Which is Filled with Sand as a Support. About 8 in. of the Other Specimens are Likewise Imbedded in Sand and All Forms are, of Course, Accidental

The accompanying group of photographs show some of the later results. They were poured from dregs remaining in ladles of common foundry iron, being poured into a rough wooden box without bottom, 4 ft. high, 12 in. square on the inside at the bottom and 8½ in. square at the top. This box rested on a bed of sand and it was filled with pieces of broken charcoal. The iron was poured in at the top and percolated down through the charcoal to the bottom. The box was lifted off in a few minutes and the charcoal allowed to burn slowly away, leaving all the filaments of the iron intact. The castings made in the box were all about 4 ft. high when cast and taller ones could be easily made, but they would be difficult to handle. The castings as shown in the photographs rest on the bottoms of boxes 8 in. deep, filled with sand to support them in upright position. It is noticeable that many of the tree-like castings have shapes like small birds perched on the branches. There are no duplicates and infinite variations in forms result from varying the size of lumps of charcoal and proportion of fine granulations.

Experiments have been made by substituting straw for charcoal, as suggested by one of our correspondents, but the straw burns away too rapidly for the metal to solidify in long, delicate filaments. The metal instead forms only a pool of iron in the bottom.

Taller castings than 4 ft. have not been attempted, although they could just as readily be cast 10 ft. high, Mr. Outerbridge asserts, but he would not know how to support or handle them. One of the latest castings took on the form of a fir tree. The molders, in a mirthful mood, decorated it for Christmas with all sorts of gaily colored tobacco advertisements, cotton waste, chaplets, trowels, slickers and other small implements of their trade. The general effect at a distance was really remarkable, and the tree was placed on an elevation so that every man entering the foundry could see it.

Some of the earlier guesses hazarded as possible solutions were: the lost-wax process; imbedding plants in fine molding sand and burning out the organic materials at very high temperature and pouring in a white hot mold; long immersions of iron castings in a weak acid solution, which slowly dissolved the iron, leaving the carbon, etc., in a skeleton form. A guess from a prominent metallurgist was that the metal was skilfully poured into water. Another theory suggested was that the molten iron was poured into a pipe coated inside with magnesite and surrounded with a coil of insulated wire through which powerful currents were sent from a dynamo. As Mr. Outerbridge suggests, this correspondent evidently did not know that molten iron is not subject to magnetic influence. About 30 years ago, Mr. Outerbridge mentioned, a patent was issued in this country for casting chilled cast-iron carwheels in an iron chill ring surrounded with a wire coil connected with a dynamo. He was directed to test the plan, notwithstanding his assertion that iron was non-magnetic at any temperature above cherry red, and so it proved to be. Needless to say the patented process was never used.

One guess which came very close to the real solution was made by Joseph A. Powell, of the Baird Machinery Company, Pittsburgh, who wrote in part as follows: "Years ago, the writer, when a boy visited a copper plant (whether a mine, a foundry or something I do not remember), at Point St. Ignace, across from Mackinac Island. At that time there was made for my father a copper casting very similar in general form to the gray iron casting shown at the right hand of the first picture in the

second line of the cuts shown on page 1095 in the November 13 issue of your always welcome *Iron Age*. This was made by pouring the hot metal into a flask in which a handful of straw, twisted and crushed by the hand, had been placed. The hot metal burned the straw away, leaving fantastic shapes of the metal itself. Just how the crumpled-up straw is placed in the mold I do not know, but I rather suspect that these iron castings were made in exactly the same manner as the beautiful copper ornament that was in our home for many years." Mr. Outerbridge regards this process as possible on a very small scale, pouring an ounce or two of copper, but is not feasible using a large amount of molten metal.

The head of an engineering and metallurgical laboratory in Philadelphia suggested that the results indicated might possibly be obtained by the following method: "Prepare a cylindrical mold, say 6 ft. in diameter and 3 in. deep; provide the pattern with a longitudinal opening, say a ¾-in. pipe; pour the melted metal at a high temperature to about half the depth of the mold; use the pattern as a stopper some inches above the level of the melt, holding it there securely; get out of the way and let an ounce or two of water through the pipe and see what happens. A pinch of dynamite, with its peculiar tendency to exert its force downward, might do the job better. Seems to me the trick could be done effectively in some such way as this."

By another it was suggested that the castings might be obtained by a method analogous to that used for artificial silk; that is, the molten iron is forced through small openings under pressure. Another guess was that the investigator had melted and drawn off the "eutectic," leaving a sort of metal skeleton. A number of other more or less ingenious suggestions have been made, the most popular idea being that the molten iron was poured into some viscous liquid, like whale oil, or molasses, or even water. It seems to be generally conceded that the production of such intricate and delicate forms in cast iron (or, indeed, in any metal) is as novel as it is astonishing to experts.

New Merchant & Evans Motor Tractor

The Merchant & Evans Company, Philadelphia, Pa., has put on the market a tractor truck which is rated as a four-ton vehicle, but is claimed to be strong enough for 10,000 lb. The novelty of this truck consists in the arrangement of the motor clutch transmission and jackshaft as a unit on a dead front axle, so that axle, engine, transmission, jackshaft, etc., turn with the wheels up to a 90-deg. angle right and left. The turning is effected by means of the steering wheel through bevel gears rotating a worm that engages the circumference of a large worm wheel attached to the forward part of the main frame. The tractor is so made that bodies of old vehicles can be used which are suitable for the work contemplated. The greater part of the load is carried on a body with steel wheels, thus saving the cost of rubber tires. The vehicle is pulled by the power-driven front wheels and not pushed from the rear, thus requiring less fuel consumption.

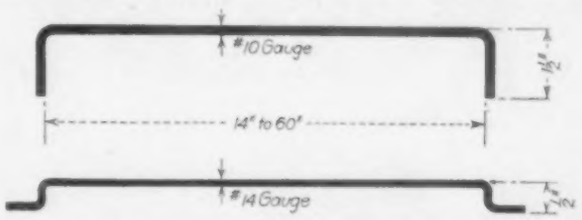
George Weidley, designer for the Premier Motor Mfg. Company, Indianapolis, Ind., has perfected a new automobile engine which he will publicly exhibit for the first time at the Automobile Show in New York in January. It has fewer parts than the standard engine and will be of the poppet valve type. Mr. Weidley claims that with it 75 per cent. more mileage can be gotten out of gasoline than from the present styles of engines. It is so inclosed as to be dust and dirt proof. There are no new principles in the make-up of the engine but a new application of the standard principles.

The American Blower Company, Detroit, Mich., has taken an order from the Ford Motor Company for eight air washers, each with a capacity of 56,000 cu. ft. per min. These washers will be installed in new Ford factory buildings. Another large order recently taken by the American Blower Company, which has just been shipped, is for washers having a capacity of 160,000 cu. ft. per min., to be installed in the Kaufman department store, Pittsburgh.

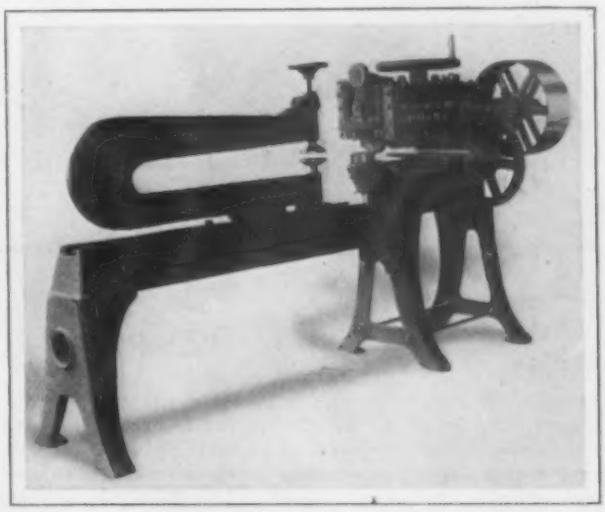
Flanging Machine for Barrel Bottoms

A new type of bottom flanging machine, which is designed for turning out tops and bottoms with rectangular flanges for barrels, tanks, etc., has been built by the Niagara Machine & Tool Works, Buffalo, N. Y. It can be used for producing heads of different diameters and is offered as a substitute for presses and dies where the cost of doing the work in that way would be prohibitive in many cases on account of the large number of dies required. In addition to forming flanges, the machine can also be used for cutting circular disks and for slitting sheets.

The machine is single back geared and has both tight and loose pulleys. The main gear is mounted on the lower shaft and the upper shaft is driven from it by a compensating connecting gear. The lower flanging roll is



Two Typical Specimens of Barrel Flanges



A Machine for Turning Out Barrel and Tank Heads and Bottoms with Rectangular Flanges and Also for Cutting Disks and Slitting Sheets

mounted on a vertical shaft that is driven through bevel gears from the main shaft. The upper shaft can be adjusted laterally to compensate for variations in the thickness of the material, an eccentric segment lever located at the front of the machine within easy reach of the operator being provided for this purpose. It is also possible to raise and lower the upper shaft by a system of screws, spindles, gears and a handwheel mounted on top of the machine, it being pointed out that this variation in hight does not move the shaft out of a horizontal position. To prevent the metal from being distorted during the flanging operation, two holddown rolls are mounted on the slide in front of the upper flanging roll. These rolls can be raised and lowered quickly by an eccentric lever to facilitate the removal of the flanged disks.

These machines can be furnished in a number of different sizes, the one illustrated having a capacity of disks from 14 to 60 in. in diameter. No. 10 gauge, soft sheet steel and lighter can be used and the maximum hight of flange possible is 1½ in. In addition to the flanges shown in the line drawing, a number of other shapes can be produced by employing various kinds of forming rolls. By removing the flanging rolls and substituting rotary cutters, it is possible to cut circular disks in No. 8 gauge metal from 8 to 53 in. in diameter and also to slit sheets.

The Harris Automatic Press Company, Niles, Ohio, has secured from the Bureau of Engraving and Printing at Washington a contract for 16 wetting machines to be used for moistening the paper on which currency is printed.

Tabular Laying Out of Roll Passes

Its Application to Four Methods of Rolling Rails in Germany

An article in Stahl und Eisen for October 9 by C. Holzweiler, rolling mill superintendent at Rothe Erde, Aachen, Germany, deals with a tabular method of laying out roll passes in order to assist in getting good results. It has been in use at Rothe Erde for more than 30 years. As an example the case of an I-beam, section N. P. 27, is first given. The design of the nine passes from the bloom to the finished section is shown, and a table giving an analysis of these passes. This consists of 15 columns. Nos. 2, 3 and 4 deal with the web, No. 2 giving the width through the web, No. 3 the thickness of the web, and No. 4 the ratio of this thickness at each pass to that of the preceding pass; in other words, the amount of reduction at each pass. With the exception of the first pass where a heavy draft is taken the ratio decreases fairly continuously from 1.67 to 1.08.

Columns 5 to 13 deal with the flanges. No. 5 shows the total hight and No. 6 the ratio of these hights, just as No. 4 shows the ratio of the web thickness. It gradually increases from 1.04 to 1.09. This gradual rise is chosen so that sections may be produced in the finishing passes with high flanges. Column 7 shows the hight of each flange from the pitch line at each pass, and whether the flange is rolled in an open or closed pass. No. 8 gives the ratio numbers of these hights. No. 9 gives the projection of the flanges from the web to the free end, and again shows the open and closed passes. No. 10 gives the thickness of the flange at the web, and No. 11 shows the ratio number for this dimension. Nos. 12 and 13 give similar details for the free end of the flanges. The last two columns, Nos. 14 and 15, give the radius of the fillet uniting the flange and web, and the ratio number of this dimension.

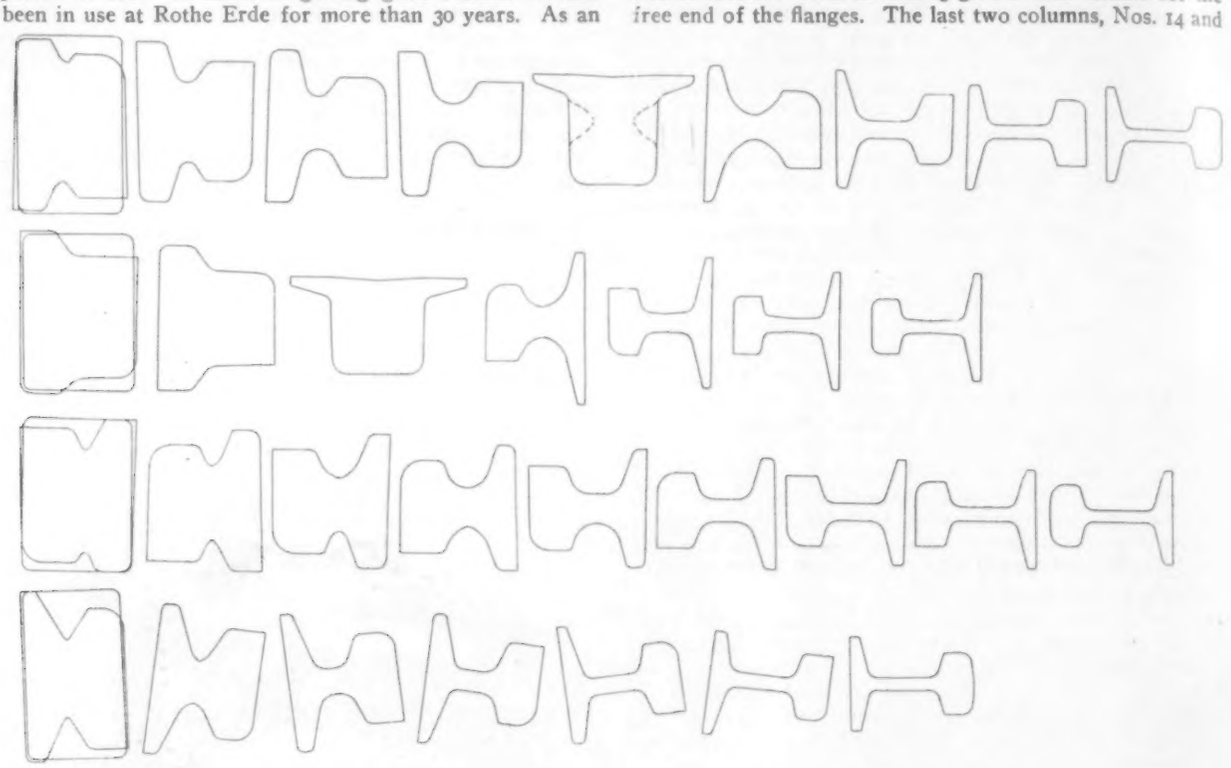


Fig. 1—Nine Passes with One Upsetting Pass
Fig. 2—Seven Passes with One Upsetting Pass

Fig. 3—Nine Passes with No Upsetting Pass
Fig. 4—Seven Passes with No Upsetting Pass

Four Methods of Rolling Rails

In addition to this example four methods of rolling rails are given. Fig. 1 shows the oldest method, where the formation of the web is begun at the first pass from the bloom. After the fourth pass a so-called upsetting pass is used, the object of which is to widen the flange and regulate the hight of the rail. Fig. 2 shows a method where the formation of the web is begun after the upsetting pass. Fig. 3 and Table 1 give a method where no upsetting pass is used, and where the bar does not require turning during the rolling operation. B signifies a closed pass, and H an open. Fig. 4 and Table 2 show a similar arrangement, only in this case the center line of the passes is not parallel to that of

Table 1. Design for rolling rails, according to Fig. 3.

PASS	WEB			BASE										HEAD									
	Width, m.m.	Thickness, m.m.	Ratio	Width of base, m.m.	Ratio	Half width of base, m.m.	Ratio	Thickness at web, m.m.	Ratio	Thickness at free end, m.m.	Ratio	Projection, m.m.	H'ght m.m.	Ratio	Half height, m.m.	Ratio	Depth at web, m.m.	Ratio	Depth at side, m.m.	Ratio	Projection m.m.
Bloom	130	180	.....	180	....	90.	....	.....	....	.....	....	.....	180	....	.....	....	....	....	....	....	....
						90.															
1	135	120	+1.50	180	±0	B83.	+1.09	B53.5	....	B42.5	....	B23.	160	....	B73.	....	B73.	....	B65.	....	B13.
						H97.	−1.08	H57.5		H38.5		H37.			H87.		H75.		H62.		H27.
2	135.5	86	+1.40	167.5	+1.07	H80.	+1.04	H57.5	−1.07	H38.5	+1.11	H37.	139	+1.13	H70.	+1.04	H75.	−1.03	H62.	+1.05	H27.
						B87.5	+1.11	B51.	+1.13	B33.5	+1.15	B44.5			B69.	+1.26	B70.	+1.07	B57.	+1.09	B26.
3	137	62	+1.38	159	+1.06	B74.75	+1.07	B51.	+1.13	B33.5	+1.15	B43.75	123	+1.13	B58.75	+1.19	B72.	+1.04	B50.	+1.05	B27.75
						H84.25	+1.04	H42.	+1.22	H24.	+1.40	H53.25			H64.25	+1.07	H65.	+1.08	H52.	+1.10	H33.25
4	137	45.5	+1.36	149	+1.07	H76.	−1.02	H42.	+1.22	H24.	+1.40	H53.25	110	+1.12	H56.	+1.05	H65.	+1.11	H52.5	+1.12	H33.25
						B73.	+1.15	B38.5	+1.09	B22.	+1.09	B50.25			B54.	+1.19	B60.5	+1.07	B49.	+1.06	B31.25
5	138	34	+1.34	140.5	+1.06	B69.5	+1.09	B37.5	+1.12	B21.	+1.14	B52.5	99	+1.11	B49.	+1.15	B60.	+1.08	B48.5	+1.08	B32.
						H71.	+1.03	H32.5	+1.19	H15.5	+1.42	H54.			H50.	+1.08	H55.	+1.10	H44.5	+1.10	H33
6	139	26	+1.31	132.5	+1.06	H69.5	±0	H30.5	+1.23	H14.5	+1.45	H56.5	90	+1.10	H46.	+1.07	H53.	+1.13	H43.	+1.13	H33.
						B63.	+1.13	B30.5	+1.07	B14.5	+1.07	B50.			B44.	+1.14	B52.	+1.06	B42.	+1.06	B31.
7	140	20.5	+1.27	125	+1.06	B62.5	+1.11	B28.	+1.09	B13.5	+1.06	B52.25	83	+1.08	B41.	+1.12	B49.	+1.06	B40.	+1.07	B30.75
						H62.5	+1.01	H25.5	+1.19	H10.	+1.45	H52.25			H42.	+1.05	H47.	+1.11	H38.	+1.10	H31.75
8	142	16.5	+1.24	118	+1.06	H65.	−1.04	H23.5	+1.19	H 9.5	+1.42	H56.75	77.5	+1.07	H39.	+1.05	H43.5	+1.13	H35.5	+1.13	H30.75
						B53.	+1.18	B24.5	+1.04	B12.	−1.20	B44.75			B38.5	+1.09	B43.5	+1.08	B35.5	+1.07	B30.25
9	145.5	14	+1.18	111.6	+1.06	B55.8	+1.17	B23.	+1.02	B10.9	−1.15	B48.8	73	+1.06	B36.5	+1.07	B41.8	+1.04	B34.5	+1.03	B29.5
						H55.8	−1.06	H23.	+1.07	H10.9	+1.10	H48.8			B36.5	+1.05	B41.8	+1.04	B34.5	+1.03	B29.5

B=Closed pass. H=Open pass.

Table 2. Design for rolling rails, according to Fig. 4.

PASS	WEB			BASE									HEAD							
	Width, m.m.	Thickness, m.m.	Ratio	Width of base, m.m.	Ratio	Half width of base, m.m.	Ratio	Thickness at web, m.m.	Ratio	Thickness at free end, m.m.	Ratio	Projection, m.m.	H'ght m.m.	Ratio	Half hight, m.m.	Ratio	Depth at web, m.m.	Ratio	Depth at side, m.m.	Ratio	Projection, m.m.
Bloom	117.	220	.....	220	....	11.0 11.0	....	.....	....	.....	....	.....	....	....	.....	....	....	....	....	....	.....
1	122.5	91	+2.42	203	+1.08	B 9.8 H10.5	+1.12 +1.05	B49. H51.	....	B23.5 H18.	....	B52.5 H59.5	167	....	H85. B82.	....	H60. B66.	....	H46. B41.5	....	H39.5 B36.5
2	126	49.5	+1.84	180	+1.13	H93.	+1.05	H41.5	+1.18	H15.5	+1.51	H68.25	132	+1.26	B63.	+1.35	B67.5	+1.02	B43.	+1.07	B38.25
3	130	31	+1.45	164.5	+1.10	B87. B79.	+1.21 +1.18	B46.5 B37.	+1.10 +1.12	B19.5 B17.	−1.06 −1.10	B62.25 B63.5	108	+1.22	H60. H56.	+1.19 +1.12	H68. H60.	−1.03 +1.13	H44. H44.	−1.06 −1.02	H44.25 H40.5
4	135	25	+1.24	154	+1.07	H85.5 H81.5	+1.02 −1.03	H35. H31.5	+1.32 +1.18	H14. H12.	+1.39 +1.42	H70. H60.	98	+1.10	B52. B46.	+1.33 +1.22	B61.5 B54.5	+1.10 +1.10	B45. B43.5	−1.02 +1.01	B36.5 B33.5
5	138	20	+1.25	135	+1.14	B72.5 B64.5 H70.5	+1.18 +1.26 +1.03	B33. B28. H26.	+1.06 +1.12 +1.27	B15.5 B14.5 H11.	−1.11 −1.21 +1.41	B60. B54.5 H60.5	85.5	+1.14	H52. H42.5 B43.	=0 +1.08 +1.21	H55. H47.5 B49.	+1.12 +1.15 +1.12	H42.5 H38. B40.	+1.06 +1.12 +1.06	H39.5 H32.5 B33.
6	142.5	17.5	+1.14	124	+1.09	H70. B74.	−1.08 +1.30	H24. B25.	+1.16 +1.04	H11.5 B13.5	+1.28 −1.23	H61.25 B45.25	77.5	+1.10	B37. H40.5	+1.14 +1.06	B44. H44.	+1.08 +1.12	B39.5 H36.	−1.04 +1.11	B28.25 H31.75
7	147	15.5	+1.13	112	+1.11	B56. H56.	+1.26 −1.05	B23.5 H23.5	+1.02 +1.06	B12. H12.	−1.04 +1.13	B48.25 H48.25	74	+1.05	B37. B37.	=0 +1.10	B43.5 B43.5	+1.01 +1.01	B36. H36.	+1.10 =0	B29.25 B29.25

B = Closed pass. H = Open pass.

the rolls. This so-called diagonal method of rolling has the advantage that the rolls require little dressing when the passes are worn, and the head and flange surfaces can be finished smoother. The side thrust of the metal while being rolled has to be taken care of, otherwise a sideways displacement of the rolls may take place. The table shows that no thought was given to uniform reduction, the passes evidently being designed without the help a table would give. Mr. Holzweiler has used the methods given in Figs. 1 and 2 with good results. Recently method 3 has been used, but not enough steel has been rolled to give conclusive evidence as to its value. The working up of the metal, however, seems to be better.

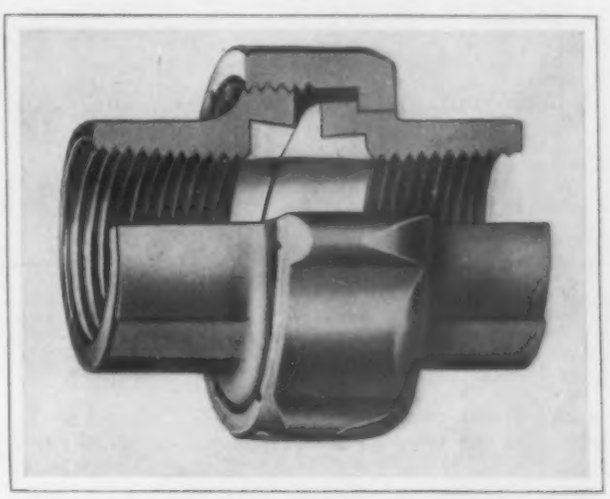
The choice of the roll design naturally depends in the first place on local conditions. The number of passes especially can vary greatly. For instance some mills roll by the method shown in Fig. 3 in only five or seven passes, whereas nine passes are used at Rothe Erde. The difference is mainly due to the strength and kind of the mill engines. In the discussion A. Lichthardt of Dortmund said that his company had rolled rails by the method shown in Fig. 4 for a number of years, with only five passes, and with very good results. The rolls have to be very well supported against the side thrust, but with suitable construction this does not give any trouble. After each redressing the passes are as good as new, only a few millimeters have to be turned off, and the rolls therefore give great efficiency. The work the material receives by this method of rolling is excellent. The heavy reduction of the steel is not only not harmful, but the tests show it to be very advantageous. G. B. W.

A New Pipe Union of Pressed Steel

After several years of exhaustive experiment, the Rockwood Sprinkler Company, Worcester, Mass., has developed a pressed steel union, designed for heavy as well as light work, and has commenced to place it upon the market in standard sizes from ¼ to 2 in. The material is a grade of deep drawing steel which the tests have demonstrated to be best for the purpose. Because the union is of steel, its coefficient of expansion is the same as that of steel pipe, which makes leakage at the threads, because of expansion, a very remote possibility. The bronze seats are carefully ground after being clinched into place in a toggle press, under a pressure so great that they are densified and practically welded with the steel, so that they cannot loosen and thereby cause leakage. This densification is an extra protection against corrosion. In addition, the union is sherardized after threading and before grinding, which protects the steel surfaces from oxidation. The unions are guaranteed for service under any pressure of steam, water or gas, up to 500 lb. per sq. in.

The necessity of taking apart a union after it has been in service for some time frequently arises. In the Rockwood union the nut is so slotted across the faces of the internal thread that upon the application of a few drops of kerosene all the threads are quickly reached by the fluid. The result is that the nut can be loosened easily.

The development of the union was not accomplished quickly. Mechanical obstacles were encountered, and were overcome only by original ideas in the drawing processes, which are now subjects of patent applications, and by the selection of equipment, comprising double back geared toggle presses, automatic machines, special grinding machines and tools produced by the highest class of labor.



View of a New Pressed Steel Pipe Union Partially Cut Away to Show the Interior Construction and the Ground Bronze Seat

Pennsylvania Supervision of Engineers

A code of laws whereby engineers desiring to engage on public work or in large industrial, transportation or construction enterprises may apply to a State board for certificates as to fitness and the practice of the profession, brought to a certain extent under State supervision, may result from the recent appointment by the Governor of Pennsylvania of the Engineers' Commission. This commission was authorized by an act of the last Legislature, which provided funds for a complete inquiry into the practice of engineering of all kinds within Pennsylvania and the making of recommendations to the Governor by November 1, 1914. The members of this commission are John Price Jackson, State Commissioner of Labor and Industry and former dean of the school of electrical engineering at State College; F. Herbert Snow, chief engineer of the State department of health; Samuel A. Taylor, past-president of the American Institute of Mining Engineers and engaged in practice at Pittsburgh; George S. Webster, chief engineer, bureau of surveys, Philadelphia; and J. Murray Africa, engineer and surveyor, Huntingdon. For years the engineering societies have advocated the creation of this commission.

The Vulcan Engineering Sales Company, Chicago, has removed its office from the Fisher Building to 2061 Elston avenue.

Two New Types of Cold Rolling Mills

Products of the Standard Machinery Company with Speed and Power Variation

The Standard Machinery Company, Providence, R. I., is building two new types of rolling mills. One of these which is designated as the No. 6 mill has rolls 8 in. in diameter, with a 10-in. face, while the other which is the one illustrated, the No. 7, has rolls 11 in. in diameter and the same face width as the other. Both are designed for cold rolling and embody various new features.

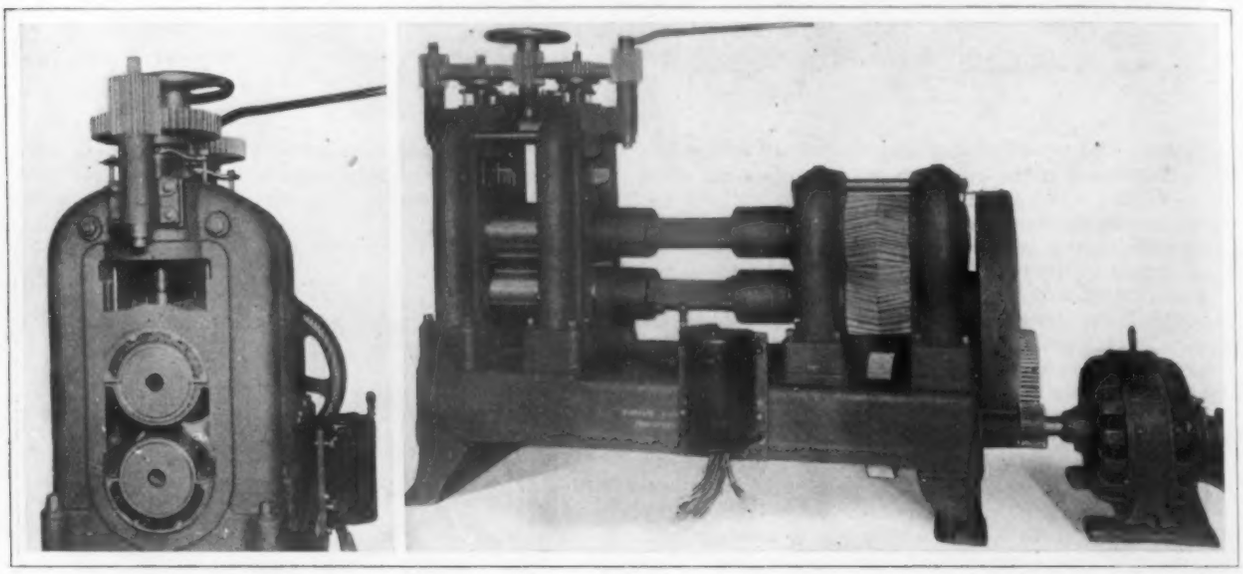
The No. 6 machine is direct connected to a 20-hp. Westinghouse motor, mounted beneath the bed and having a special controller and special resistance coils in the circuit. The motor has a speed variation of 2 to 1, the normal rate being 1150 r.p.m., and a corresponding change in the horsepower, control being effected by the setting of the lever on the several notches of the controller. This feature is important because it permits the operator, in starting in with heavy stock, to vary the speed and power to procure the most advantageous results. Another new feature of this machine is its equipment with roller bearings on the roll journals. The estimated resultant decrease in required power as compared with a plain bearing mill is calculated at from 35 to 60 per cent. The rolls are of chrome alloy steel, the faces being mirror lapped. The journals and bodies are hardened.

The adjusting screws, located on top of the roll housings directly below the large spur gears, each have a disk that permits of micrometer adjustment. The screws are left hand and the gear ratio between the idler pinion and the gear is 5 to 1, which permits a considerable pressure on the pinion wrenches for heavy and dense stock. The handwheels are provided to permit of raising the screws rapidly when no load is required. The housings are of heavy construction. On the rear of the mill is a running-out table, with a running-in swivel table having guides at the front of the machine. In the gear housings are cut-steel herringbone gears, while the other two trains, exclusive of the motor train, are of cast steel, with cut teeth, and run in bronze lined bearings. The motor pinion is of rawhide and its gear of cut steel. The rear end of the bed is entirely self-contained and is of the box type which gives a double bearing on each gear.

The specifications of the No. 6 mill follow:

Weight of mill, without motor, lb	10,230
Diameter of roll journals, in	5⅛
Length of roll journals, in	7¼
Gear ratio of mill, exclusive of motor train	21½ to 1
Gear ratio of mill with motor train	65½ to 1
Normal speed of rolls, ft. per min	17½
Over-all length of mill, ft	7
Over-all width of mill, ft	4
Hight of mill, ft	7
Working hight, in	38½

The No. 7 mill is of similar construction and its 30-hp. alternating-current motor permits the same variation in speed and horsepower. The roll journals are fitted with roller bearings, but the adjustment of the rolls is somewhat different. A central handwheel raises the two rolls at the same time and also lowers them, on light strains. It is so constructed that it can be slipped off so as to permit of independent adjustment either from the screws or the pinion. The screws have micrometer adjustment. The motor is at the rear instead of underneath the bed, as in the No. 6 machine. The gearing, including the cut-steel herringbones, is triple trained, and, including a motor train, four trained. All gears with the exception of the motor pinions are of cut steel. The herringbone gears are made in halves and are forced on their respective arbors in either direction. Both the wabbler couplings and the wabblers are of cast steel. The rolls are of hardened and ground chrome alloy steel, mirror lapped.



End and Front Views of a New Motor-Driven Cold Rolling Mill Possessing a Number of Interesting Features

The bed proper is cast in one piece. Below the inner gear housing is a heavy rib which is bored simultaneously with the outside bearings in the rear of the bed, which provides a double bearing for each gear shaft.

The specifications of the No. 7 mill follow:

Weight of mill, lb	15,700
Diameter of rolls, in	11
Face of rolls, in	12
Diameter of journal, in	8
Length of journal, in	8½
Gear ratio of mill	30 to 1
Gear ratio of mill, with motor train	90 to 1
Speed of rolls, r.p.m	13
Speed of motor, r.p.m	1,150
Length of mill, in	150
Width of mill, ft	4
Hight of mill, ft	7
Working hight, in	38½

On account of the extra depth of the roll housings this mill sets much lower than the other.

Pulverized coal is not favored for steam boilers by Prof. R. C. Carpenter, Cornell University, who discussed the subject recently in the Sibley Journal of Engineering. He doubts whether the cost of properly pulverizing the coal would be warranted by any improvement in efficiency which would be obtained above the efficiency now secured with stokers. Another serious objection he considers is the cost of the installation, including the grinding, feeding and drying equipment. At any rate, he asserts that before a system of pulverized coal burning can succeed under a boiler furnace, such change in form will have to be made to permit the coal to be burned while in suspension.

The Cumberland Foundry & Mfg. Company, Nashville, Tenn., which makes a specialty of semi-steel castings, has recently installed an up-to-date machine shop for general jobbing work, and is now fully prepared to handle almost any kind of work in the machine line. A. J. Witt is general manager of the company and A. N. Sherg is in charge of the machinery department.

New Method of Using Coke-Oven Gas

Mixing It with the Burnt Stack Gases in an Open-Hearth Furnace

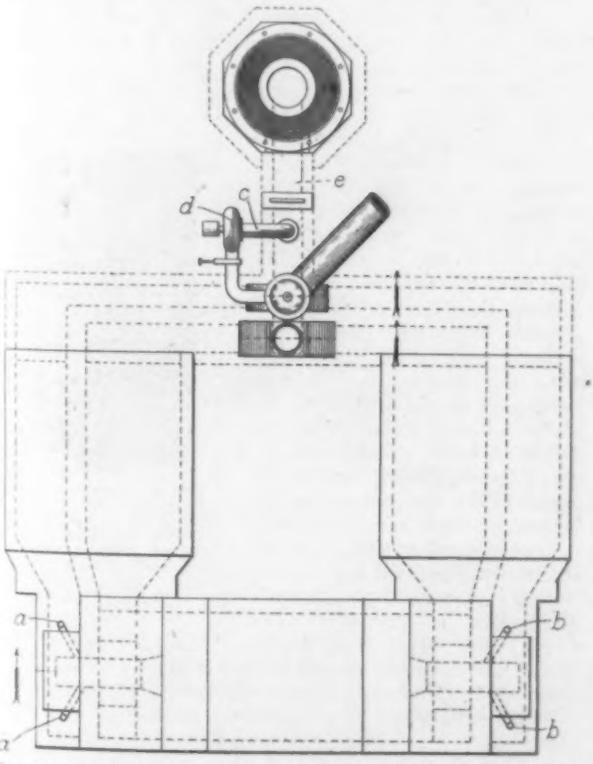
A patent (1,079,642) has been granted to Nicholas F. Egler, Chicago, and assigned to Thomas S. Blair, Jr., of the same city, the object of which is to make it possible to overcome the disadvantages of burning coke-oven gas in open-hearth furnaces. The patent covers a regenerative furnace, with gas and air ports at each end, and having means of returning burnt gas from one end of the furnace to the gas port at the opposite end, and also means of introducing coke-oven gas into the burnt gas.

Coke oven gas is light and has a high heat content. In applying it to open-hearth furnaces it has a great tendency to rise and pierce the protecting air blanket, causing great damage to the roof. Its flame also has been of an unsatisfactory and uncontrollable nature so that the heat units were not used to the best advantage, a larger number of heat units per ton of steel being required than with the other more controllable fuels. Attempts to mix it with air at the ports, as in the case of natural gas, have not overcome these difficulties. It burns close to the port, developing a large amount of heat suddenly, with a brush-like scattering flame. The patentee claims to have remedied these difficulties and to be able to produce in an open-hearth furnace a coke-oven gas flame that is thoroughly controllable. This is done by mixing the coke-oven gas in the gasports with the inert and relatively heavy burnt gases of the furnace.

The following table shows the specific gravity and the heat units of coke-oven gas, producer gas, stack gas from a coke-oven gas furnace, and of certain mixtures of coke-oven gas with stack gas.

	Specific gravity (air=1)	B.t.u. per cu. ft.
Coke-oven gas	.4865	600
Producer gas	.8923	150
Natural gas	.564	1,100
Stack gas	.9562	0
Coke-oven gas—1 part Stack gas —3 parts	.8387	150
Coke-oven gas—1 part Stack gas —1 part	.7214	300

From this it appears that it is not difficult to obtain a mixture of coke-oven and stack gases having exactly the heat units and practically the specific gravity of producer gas. This mixture burns practically as does producer gas.

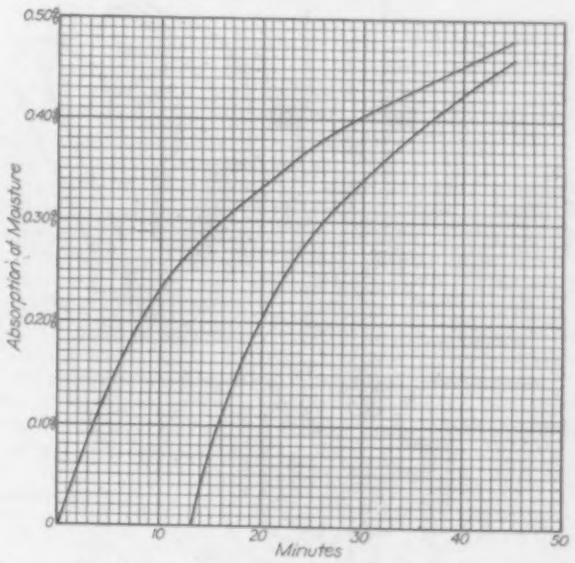


Furnace and Device for Burning Coke-Oven Gas with Burnt Stack Gases

The patentee's method of accomplishing this is shown in the illustration. The coke-oven gas is admitted to the two gas ports through the pipes *a* and *b*. The products of combustion in the furnace may be conducted from the outlet end of the furnace back to the gas port, or parts communicating therewith, through the by-pass *c*, a pump *d* being interposed in this by-pass to secure the proper draft. In the preferred form this by-pass leads from the conduit *e* leading to the stack, or from the stack proper, to the space above the gas-reversing valve or to the intake end of the gas-reversing valve. The point at which the coke-oven gas should enter the stream of stack gas is immaterial so long as it be far enough from the mouth of the port to insure a good mixture.

Moisture Absorption by Pulverized Coal

The accompanying chart shows two curves which represent the amount of moisture absorbed by dried pulverized bituminous coal. They are the result of an interesting investigation made by Charles R. McCabe, Lima Locomotive Corporation, Lima, Ohio, and the growing importance of this material as a fuel is calculated to direct attention to information on its hygroscopic nature. Mr. McCabe emphasizes that the ease with which powdered coal absorbs moisture should be considered carefully by those arranging to burn it.



Moisture Absorbed by Dried Pulverized Coal; Sample, 10g., So That 1 mg. Increase in Weight Corresponds to 0.01 per cent.

The determinations indicate that dry pulverized bituminous coal absorbs about 0.01 per cent. of moisture per minute in an ordinary indoor atmosphere for about ¾ hr. and that thereafter the absorption is slower but continuous for almost an indefinite period. Each sample of coal weighed 10 grams, and the vertical spaces or ordinates of the chart represent in each case 1 milligram, or 0.01 per cent. increase in weight, that is, absorption of water vapor. The effort was made to note the weight at the end of each minute, and consequently the curves are not altogether smooth or regular. The draftsman averaged the points by sections or groups of readings rather than by attempting to run a smooth averaging curve throughout the range of the determination.

The A. D. Granger Company, 90 West street, New York City, has sold for the municipal asphalt plant, New York City, one Bates heavy duty Corliss engine, belted type; three Lycoming high-speed engines to the Wells & Newton Company, for public school No. 53, New York City; to the Braender Rubber & Tire Company, Rutherford, N. J., one 250-hp. Union water-tube boiler, steel stack, and erection work complete; to the village of Hempstead, Long Island, complete plant, consisting of two 150-hp. Massachusetts law boilers, erected with all accessories; to George Baker & Sons, Brooklyn, N. Y., one 150-hp. horizontal return tubular boiler unit, erected complete.

The Grant Iron & Metal Company, dealer in old material, 292-306 Franklin street, Detroit, Mich., has added to its yard equipment a 15-ton industrial locomotive crane with magnet.

The Harroun Kerosene Carburetor

The accompanying drawing is presented to show the features of the Harroun kerosene carburetor, which, as announced in *The Iron Age* of December 4, has been taken over by the Electric Renovator Mfg. Company, Pittsburgh, though an office will be retained in Indianapolis.

Part of the exhaust is forced through the space around the corrugated surface, heating it to a cherry red. This passage is in the form of a spiral and as the dense atomized fuel is drawn through by the suction of the motor the heavier parts are thrown to the outside against the heated surface by the centrifugal force and the more volatile portion of the fuel, it is stated, remains in the center. The idea is that the fuel, as it is sprayed from the nozzle and comes in contact with the hot surface,

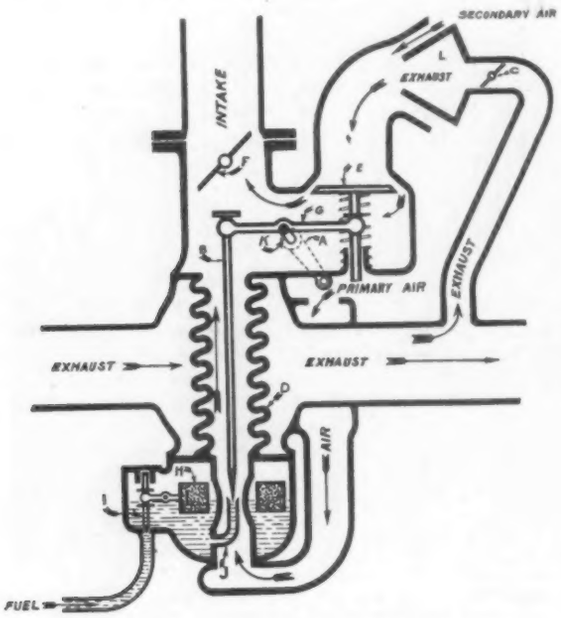


Diagram of the Harroun Kerosene Carburetor

is turned into a vapor. This vapor is partially mixed with air which comes through from the bottom and is further diluted with cold air which comes through the secondary air valve. The fuel opening in the nozzle is automatically opened and closed by the action of the secondary air valve. There is but one adjustment on this carburetor. That is operated from the driver's seat through a suitable connection to the lever A on the side of the carburetor. This raises and lowers the fulcrum of the rocker arm G, which is inside of the carburetor and raises and lowers the needle B as it is actuated by the air valve E.

One of the features of this carburetor that is emphasized is that of taking a small portion of the exhaust gas back into the charge through the air valve opening. It appears that it has been discovered that a part of the exhaust gas mixed with the charge eliminates the disagreeable pound which is always more evident with kerosene than with gasoline. Water has been used a great deal to accomplish this result, but the use of water necessitates complications and is very hard to regulate. Cold weather also prohibits the use of water for this purpose.

There is furnished with this carburetor a means of regulating the amount of exhaust gas used, by the butterfly valve C. This may be operated from the dash and is to provide regulation of the maximum expansion period in relation to the piston travel under varying running conditions. It is found, for instance, that the fuel consumption per horsepower-hour ranges from ½ to ¾ lb. per hp.-hr. at about 1000 ft. per min. piston speed and increases very rapidly, both as the piston speed decreases or increases from this point, consuming sometimes, it is explained, as much as 1½ lb. per hp. at about 500 and 1600 ft. per min. piston speed. The belief is that the speed at which a correct mixture will burn happens to be just right at 1000 ft. piston speed to give maximum pressure at the moment the crank arm and connecting rod are at right angles to each other. Therefore, any agency that will retard this burning speed without retarding the spark timing at slow motor speeds will serve to increase the thermal efficiency.

The carburetor runs on either gasoline or kerosene, it is stated, without any change of adjustment. In fact it is claimed to be a highly developed gasoline carburetor which has the added feature of running on cheap grocery store coal oil. It is, indeed, claimed that the mileage is 10 per cent. greater when using kerosene than when using gasoline. Recent tests having proved that it will haul 1 ton 1 mile for 1-3 cent.

Ray Harroun is the inventor and the device is being marketed by the Harroun Company, Indianapolis, recently consolidated, as stated, with the Electric Renovator Mfg. Company.

Automatic Alternating-Current Motor Control

For keeping the speed of a machine which is driven by an alternating-current motor constant, irrespective of the number of times the machine is stopped or started, the Monitor Controller Company, Baltimore, Md., has brought out a controller for use with either single, two or three phase motors. This device is the same in general as the line of direct-control apparatus, which was brought out some time ago. With the alternating-current apparatus, however, the dynamic brake for stopping cannot be furnished, and it is necessary to use a foot brake, or else a magnetic one which is operated from the controller. The accessories used with this new type of controller are identical with those used in the corresponding types of direct-current apparatus, the starting, stopping, reversing and slight movements of the machine being accomplished automatically and every movement is controlled from a simple station, either by push button or by safety lever station, as illustrated. A distinctive feature of this new controller is that in starting a proper amount of resistance is automatically inserted in each phase of the motor circuit, which, it is emphasized, gives correct starting characteristics and is the same under all running conditions.

In operation, the starting effort required of the motor is the same, regardless of the position of the regulating handle. After the rotor has attained the proper speed, the starting resistance is automatically cut out of the circuit by the controller, and the regulating resistance that has been previously determined by the setting of the handle on the controller is automatically thrown in, bringing the motor to the desired speed, which may be at any point between the normal running rate and the lowest speed specified. A no-voltage release is provided with these controllers, so that if the line voltage should fail the entire system is automatically cut out and the motor will not start after the current is again on the line until the operator has again thrown the lever to the upper position, when the starting cycle is again gone through. In stopping the motor, it is simply necessary to throw the handle to the lower position. Two different definite speeds are secured by depressing one or the other of the two buttons at the bottom of the station.

One of the Safety Lever Stations for Use in Conjunction with a Recently Developed Automatic Controller for Alternating-Current Motors

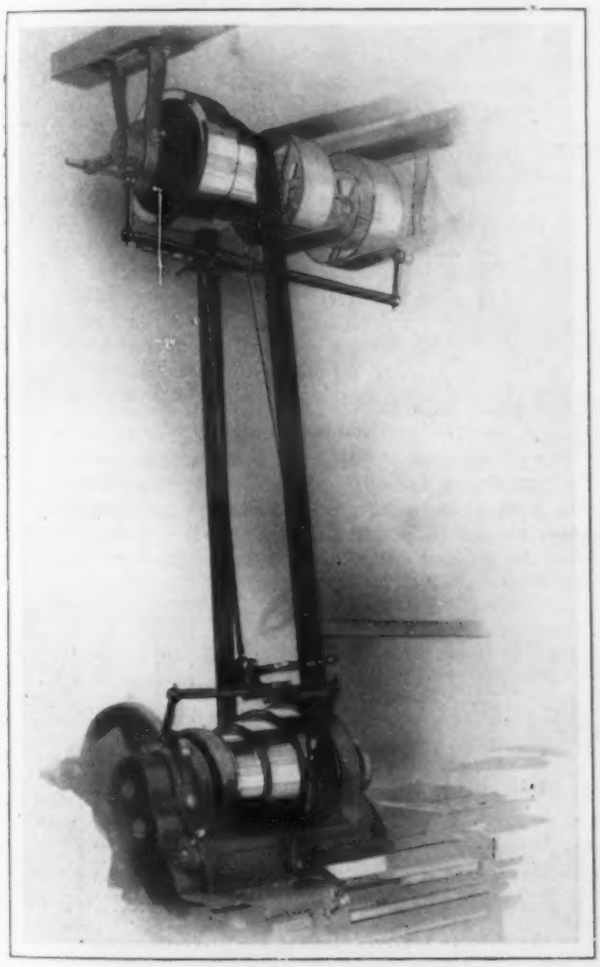
The controller used with this station, it is pointed out, has no sliding contacts or delicate mechanism of any sort. The circuits are made and broken between graphite and copper and all parts carrying considerable current are reinforced by laminated copper contacts. If desired, an overload release can be added to the equipment at a slight additional cost.

The Pawling & Harnischfeger Company, Milwaukee, Wis., last week shipped six carloads of cranes to Australian points and is constructing cranes for shipment to Prince Rupert, B. C., and France. The company's foreign business is growing rapidly in spite of the keen competition of local crane builders in foreign countries.

A Mechanical Belt Shifting Device

A mechanically operated belt shifting device that is especially adapted for use on cone pulley driven machine tools such as milling machines, lathes, etc., has been brought out by the R. K. LeBlond Machine Tool Company, Cincinnati, Ohio. Two racks mounted one on the headstock of the machine and the other on the countershaft, with a belt shifter for each rack, constitute the device, the relative positions of the rack and belt shifters being such that one shifter acts a half turn of the operating crank in advance of the other.

When it is desired to change the belt from one step of the cone pulley to an adjacent one in either direction, the crank handle is turned one complete revolution. The motion of this crank is transmitted directly to a pinion meshing with the lower rack, while a connection through bevel gears and a telescoping shaft transmits the power to a second pinion meshing with the upper rack. On account of the relative positions of the two racks, the belt is thrown from the larger step to the smaller one during the first half revolution of the crank, while when this has been done the other belt shifter becomes active and shifts the belt on the other cone pulley to the next larger step.



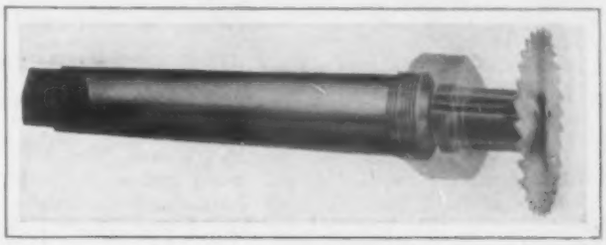
A Device for Shifting the Belt on the Cone Pulley of a Belt-Driven Machine by the Turning of a Crank

When the belt has been shifted it is automatically locked in position and cannot be moved except by turning the crank. With a view to preventing the belt from being thrown entirely off the cone pulleys, stops are provided at the limits of travel in both directions. It is emphasized that by having the crank always moved through a complete revolution for shifting the belt, the operator becomes accustomed to reaching for the handle in the position that it always assumes.

The Davis Mfg. Company, Milwaukee, Wis., has added a department for the manufacture of micrometers, specializing in tubular instruments for naval constructors. A set of 21 instruments was recently sold to the Italian Government. Other foreign powers have Davis micrometers in service.

An Internal Grip Arbor for Milling Machines

For holding saws and milling cutters of either the side-tooth, plain or formed types firmly at the tip, the Grant Mfg. & Machine Company, Bridgeport, Conn., has brought



A Recently Developed Arbor for Milling Machines Which Holds Saws and Plain and Formed Cutters by the Expansion of an Internal Sleeve

out a milling machine arbor with an internal grip. It is designed to allow plain and side-tooth cutters to be used as end and face mills respectively, and also to use cutters of smaller diameter than usual, as it is unnecessary to make any allowance for the thickness of the wall or collar.

A turn of the nut draws the sleeve over the tapered end of the arbor, causing it to expand and bind firmly against the inner wall of the hole in the cutter. In this way it is emphasized no key is required, as the grip is firmer than is the case with a nut arbor. The arbors can be supplied with either No. 9 or No. 10 Brown & Sharpe taper shanks and with sleeves for cutters having holes ⅞ and 1 in. in diameter, respectively. The distance from the end of the arbor to the end of the spindle is 2½ in. and the working length of the sleeve is one half that. If it is desired, other sizes and lengths of arbor can be supplied to order.

The Panama-Pacific Tower of Jewels

With the awarding of the contract for the steel to be used in the Tower of Jewels, the entrance structure to the Panama-Pacific Exposition grounds at San Francisco, the exposition officials have started on the way one of the last of the big pieces of constructive work. The buildings and grounds committee has awarded the contract to Dyer Brothers, San Francisco, the amount being $138,598. Other bids were taken for the general work. The entire tower is to cost in the neighborhood of $441,000 and will be completed within eight months.

Rising to the hight of 430 ft. at the main entrance to the grounds, the Tower of Jewels, says a San Francisco paper, will, without doubt, be one of the striking structural features of the great 1915 celebration. The base of the tower alone covers an acre of land. All of the frame work will be of steel, this being one of the few steel structures at the exposition. The tower will rise in terraces, each with its sculptural decorations. At the top a group of huge figures will be seen supporting the world. The tower derives its name from the fact that it is to be studded with great jewels, which at night will sparkle and scintillate under the play of masked batteries of lights. It is the design of Carrere & Hastings, architects in chief of the Pan-American Exposition at Buffalo.

Owing to the large increase in its business, and in order to meet this demand, the Gallagher Carburetor Company, 1876 Broadway, New York, has purchased the Edwards & Smith Company foundries, Easton, Pa., and will operate under the name of Lehigh Valley Foundries & Mfg. Company, with head offices in Easton, manufacturing Gallagher carburetors, Gallagher strainers, J. M. shock absorbers, special valves, including Standard Oil tank wagon faucets, Huyette steam specialties, Edwards special valves, and brass and aluminum castings of all kinds. The New York service department will be continued at 1876 Broadway.

Construction work has begun on the by-product coke oven plant of the Laclede Gas Light Company, St. Louis. The initial unit will be 56 ovens, with a daily producing capacity of about 750 tons of coke, which will be made from Pennsylvania coal, transported to St. Louis by the Ohio and Mississippi rivers.

Pulverized Coal in Metallurgical Furnaces*

Experience of a Large Lebanon Valley User in Heating and Puddling Furnaces—Further Data as to Costs

BY JAMES LORD†

About ten years ago, the American Iron & Steel Mfg. Company, noting the use of pulverized coal in the large furnaces of the cement industry, commenced the experimental use of this fuel in metallurgical furnaces. From the first it was apparent that its economical use depended upon the absolute control of the feed by the burner. This having been accomplished, we have applied it to over 100 furnaces of various types, such as those for puddling and heating, and of smaller sizes for re-heating nut, bolt and spike bars.

It has proved to be a commercial success for all these purposes, and the experience of ourselves and of others working along similar lines shows that it can be used with equal economy for basic open-hearth steel furnaces, either with or without checker work. Our experience in the use of this fuel over a number of years has been so satisfactory and so economical that we are now largely increasing our installation, and are about to apply it to open-hearth steel furnaces.

Points Essential to Success

Success in the use of this fuel requires: 1. That both the free and combined moisture be expelled by artificial heat, down to 0.5 per cent. 2. That it be pulverized so that 95 per cent. will pass through a sieve of 100 meshes to the sq. in. Over 80 per cent. that we pulverize will pass through a 200 mesh sieve. 3. The delivery to the furnace must be controlled by the burner so that the proper feed may be secured. We have burners using only 40 lb. per hour, others over 900 lb. 4. For the purposes stated above, metallurgical furnaces, the coal should have a high volatile content, not less than 30 per cent.

The coal we are now using analyzes: Volatile, 33.20 per cent.; fixed carbon, 56.07 per cent.; moisture, 1.12 per cent.; ash, 9.61 per cent. The sulphur should not exceed one per cent.

In the puddling and heating furnaces, the firing grates formerly used for lump coal, serve as combustion chambers for pulverized coal, and collect a large portion of the ash. The combustion chamber in the heating furnaces, holding about 6 tons of iron piles, is about 5 ft. from back to bridge wall. Some is collected at the base of the stack, and some, in impalpable fineness, passes through the stack. That which falls upon the material in furnace is too small a percentage to unfavorably affect it. In one of our plants, located near a residential section, we have suction fans in the stacks to collect the ash.

Equipment for Pulverizing Coal

Our equipment for preparation of pulverized coal at our Lebanon plant is as follows: The slack coal is conveyed automatically from the car to the pile, then taken by screw conveyors to the dryers, and in the same manner from the dryers to the pulverizers. When ready for use it is similarly conveyed throughout the works, in some cases a third of a mile. It is not touched by hand or shovel from the freight car to the furnace. Using slack coal we do not require a crusher. The dryers are made by several manufacturers. The pulverizers are of two types, the horizontal tube mill and the upright mill. They are practically equal in efficiency, each machine delivering about 4 to 4½ tons per hr. These mills are made by a number of manufacturers.

As the coal leaves the pulverizing plant it is weighed on a large automatic scale. The heating and puddling furnaces have each a small automatic scale, and the total of the small scales is checked up each day with the record of the large one. At the end of each line there should be an overflow pipe, to prevent the coal from choking up the screw, if anything should happen to the cross lines. Otherwise, should the coal overflow near an open fire it will burn back very quickly.

Attached to each of our furnaces is a tank or hopper of size to carry about a 15 hr. supply of pulverized coal. On several occasions the fuel has ignited in these tanks, usually on Monday mornings when the left over fuel has accumulated moisture. In such cases it is only necessary to stop the supply, and to feed the burning coal into the furnace until tank is empty. There is no danger of explosion under these conditions. Indeed, in our entire experience with this fuel we have had no explosions. These occur from coal in suspension in a room coming in contact with flame. The same result would follow filling a room with wheat flour in suspension. Proper attention to the pulverizing plants and machinery will eliminate this possible danger. It is not good practice to have the dryer in the coal pulverizing house, for the reason that if an accident should occur causing the coal to overflow, it might be drawn into the fire chamber of the dryer causing fires, with possible injury to employees.

The fuel should be delivered to puddling and heating furnaces at a low air pressure. We use 4 to 6 oz. of blast to blow the coal through a small pipe from the burner to the large blast pipe, which in a heating surface is from 10 in. to 14 in. in diameter. This large pipe conveys it to the furnace with a pressure of about 1 oz. or less, per sq. in. If these pressures are observed the roof and side walls of a furnace heating wrought iron for rolling will last 4 or 5 months, when running double turn 6 days per week.

Puddling Furnaces

As to economy of fuel, I show the actual results in our Central Works during the months of April and May, 1913. The figures show the quantity of fuel necessary to produce one ton of puddled bar, made from gray forge pig iron, the product during these months was for high grade bar requiring special work and time.

	April, pounds	May, pounds
No. 23 furnace	1,362	1,318
No. 24 furnace	1,169	1,277
No. 25 furnace	1,271	1,472
No. 26 furnace	1,371	1,362

The average for same months on a lower grade of pig, and cast scrap was 1239 lb.

Our 1912 records show cost of preparing pulverized coal as follows:

Cost of Preparing One Gross Ton of Coal

	Cents
Fuel	0.034
Repairs to buildings	0.002
Operating	0.145
Power (steam and electric)	0.221
Repairs to machinery and equipment	0.200
Total	0.602

This total includes the cost of automatic transmission through pipes to the furnaces. Analyzing the last expense item, we find repairs which should be charged over the past eight years, so that total cost of preparation and transmission did not properly exceed 50 cents per ton of pulverized coal produced during 1912.

If we separate the transmission from the actual preparation, the cost of the latter would be less than 40 cents per ton. Many plants would not require the extensive transmission required by us. When the coal is prepared as herein outlined, smoke is practically eliminated. If the stacks show black smoke, it would indicate a wasteful use of the fuel to the detriment of the operator's interest, and it is at once corrected.

Heating Furnaces

In heating iron piles for rolling we have the following results during the same months, the figures showing the amount of fuel consumed to produce a gross ton of rolled bars. On steel billets the amount would be one-third less.

*Presented at the meeting of the Engineers' Society of Western Pennsylvania, September 30, and published in the October, 1913, Proceedings.

†President American Iron & Steel Mfg. Company, Lebanon, Pa.

Name of mill	April, pounds	May, pounds
12-in. Central	516	528
12-in. West	544	570
16-in. Central	519	523

Discussion of the Paper

In the discussion William A. Evans, New England manager of the Griscom-Russell Company, Boston, said he always advocated using the very best coal obtainable, especially when working out a new problem. Good coal has enough economy to warrant its use. The trial of cheaper coal can be undertaken when other details have been perfected. Drying the coal is very desirable and the only excuse for using wet coal is limited capital for first installation. Powdered coal is very destructive because of its concentrated heat of blow pipe tendency. These objections are somewhat overcome by the use of low-pressure air introducing the coal at a very slow velocity and spreading the flame over as large an area as possible, and by the use of brick having similar chemical tendencies with the ash. The economy over oil is established. Mr. Evans stated that he had put in systems to replace oil when there has been an actual saving of 60 per cent. As compared with producer gas, with an initial loss of 20 per cent. of the sensible heat in the manufacture of the gas, powdered coal has the advantage when all the heat developed is projected directly into the furnace. When the ash can be taken care of, there seems to be a saving of about 25 per cent. by the use of coal.

Experience with Reverberatory Furnaces

James W. Rawlins, assistant smelter superintendent, Canadian Copper Company, Copper Cliff, Ontario, said that his plant was the only place where pulverized coal has been used successfully and continuously for firing reverberatory furnaces. The cost of crushing, drying and pulverizing the coal and feeding it into the furnace has averaged 40 cents per ton for the last five months. One ton of coal smelts 5 tons of charge. The temperatures obtained vary from 1540 deg. C. at the hottest point to 1200 deg. C. at the skimming door.

E. W. Shinn, chief engineer, Quigley Furnace & Foundry Company, Springfield, Mass., stated that the American Iron & Steel Mfg. Company is now burning 140 tons of powdered coal per day at its Lebanon plant and 70 tons per day at its Reading plant, giving the company the distinction of having the largest pulverized-coal furnace equipment in the world. On the puddling furnaces it has been able to reduce the coal consumption from about 2200 to 2300 lb. per ton of iron to about 1200 lb. per ton of iron with powdered-coal-fired furnaces. In its heating furnaces it has reduced the coal consumption from 900 lb. to 550 lb. per ton of iron. In order to show the savings made possible by the use of powdered coal the company is installing a plant in connection with open-hearth furnaces, which are now using oil as a fuel, where a $32,000 investment will save $100,000 per year; also a plant in a tube works, now using anthracite coal, where a $43,000 investment will save $70,000 per year. While lignite has never been tried to his knowledge, he felt confident that it could be successfully burned, but anthracite is out of the question as it cannot be lighted.

Arthur S. Mann, engineer, General Electric Company, Schenectady, N. Y., said that their first furnace for using powdered coal was intended for general forge purposes. No difficulty was experienced in reaching high temperatures. The furnace has been in service ever since July 7 of this year, and gives any heat usual in forge work. "We believe," he said, "the fuel is better than oil. We have five furnaces in use and are changing others over as fast as possible."

The Grades of Coal

E. D. Barry, superintendent, Universal Portland Cement Company, Universal, Pa., considered that the physical structure of coal had considerable to do with the ease with which it may be pulverized. Pittsburgh vein and West Virginia coals are ideal examples of the structures of coals that are most easily reduced to powder. More difficulty is experienced with the lower grades of coal such as are mined in Illinois, Indiana and in the western states. Below are samples of analysis of coal that have been burned in this way successfully:

	Volatile, per cent.	Fixed carbon, per cent.	Ash, per cent.	Sulphur, per cent.	Moisture, per cent.
No. 1. West Virginia slack coal	35.23	50.84	10.80	2.71	3.13
No. 2. Pittsburgh coal.	35.17	51.79	9.39	1.28	3.65
No. 3. Illinois coal	26.20	51.47	13.93	1.47	8.40

Samples 1 and 2 are the best, he emphasized, but it must be noted that a coal with a volatile as low as 26 per cent. has been used. There is, he suggested, a large field for investigation regarding the use of the lower volatile coals.

Some Data as to Costs

A. W. Raymond, engineer, Raymond Brothers Impact Pulverizer Company, Chicago, presented the following tabulated data on the cost of pulverizing coal gleaned from the experiments and tests of six large users:

Cost for Pulverizing Coal

Capacity of grinding room, tons per hr.	Finished product through 100-mesh screen, per cent.	HP. at ¾c. per kw. hour: Total	Hours per ton	Cost per ton, cents	Labor: Men at $2 per day	Cost per ton, cents	Cost per ton for maintenance, cents	Total cost per ton, cents
2.....	95	45	22.5	11.25	1	10.00	3.33	24.58
3.....	95	60	20	10.00	1	6.66	2.22	20.88
4.....	95	75	19	9.50	1	5.00	1.70	16.20
5.....	95	85	17	8.50	1	4.00	1.20	13.70
10.....	95	170	17	8.50	1	2.00	1.20	11.70
25.....	95	425	17	8.50	2	1.70	1.20	11.40

This table illustrates a point which is very important in the economical preparation of the coal, namely, that the larger the quantity of coal handled in the milling plant, the smaller the cost per ton for pulverizing. This is the strongest argument against the use of a system requiring small capacity pulverizers for every furnace as in the unit system.

For the cost of drying about 2 hp hr. should be figured for every ton of coal dried.

Later in the discussion Mr. Shinn stated that he had received some interesting data from the American Locomotive Company at Schenectady. In its hammer shop furnaces which are about 5 ft. 6 in. wide x 18 ft. long, blooms, about 10 in. thick x 18 in. wide x 15 ft. long, are heated to be forged into engine frames, and the coal consumption of the hand fired furnaces is 650 lb. of coal per hr., and of the powdered coal furnace 350 lb. of coal per hr., the powdered coal furnace being at the same time about 20 per cent. faster than the old furnaces. In the drop hammer shop, heating forged piston spider blanks, the heating time in one of the oil furnaces is 15 min., and in a powdered coal furnace of the same size, 12 min. This shows that the saving by using powdered coal is not altogether in reducing the quantity of fuel used, but also that the production can be materially increased.

Preheating the Air

As to the necessity of preheating the air, Mr. Raymond asserted that high temperatures are so easily obtained that it seems almost unnecessary to preheat the air and that there is very little saving in doing so. "We are not preheating the air and are obtaining temperatures as high as 4500 deg. F. with powdered coal."

Supplementing this statement, Mr. Shinn said: The American Iron & Steel Mfg. Company preheated the air in nearly all of its heating and puddling furnaces to about 500 deg. F., and after a test of considerable duration claim that it shows a saving of about 20 per cent. in fuel. In some of its heating furnaces a temperature of about 3000 deg. F., using cold air, is obtained. The air is preheated in recuperator pipes located under waste-heat boilers. As the furnace temperature is the same since using powdered coal, as when hand fired, the same steaming capacity from the boilers is obtained as before the change was made. On a comparative test between the waste-heat boilers and the boilers in the power plant, the waste-heat boilers generated about 85 per cent. as much steam per pound of coal from the waste gases from the furnaces, as is generated in the regular boilers.

A prominent part of the foregoing discussion was a paper by H. R. Barnhurst, engineer Fuller Engineering Company, Allentown, Pa., which was published in *The Iron Age* of October 23, 1913.

The Steel Corporation Dissolution Suit

Numerous Buyers Testify Competition Is Active—Some Buyers' Methods Disclosed

In the hearing in the suit for the dissolution of the United States Steel Corporation in New York City on Monday, December 15, Oliver J. Johnson, president Wheeling Can Company, Wheeling, W. Va., testified that his company buys about 300,000 boxes annually. The method followed in placing contracts is first to secure prices from different manufacturers and then to give the business to whichever concern offers the most favorable terms. On Saturday, December 13, said Mr. Johnson, he placed the contract for his company's requirements for the year 1914 with the Phillips Sheet & Tin Plate Company. The bulk of these requirements, he said was furnished by that company during 1909, 1910 and 1912. In cross-examination, Mr. Johnson's testimony developed that the price which the Phillips Company first quoted him in October, 1912, for 1913 requirements was lower than the trade paper quotation ruling at that time, which was $3.60, Pittsburgh. The Jones & Laughlin Steel Company quoted $3.50. He did not remember what the American Sheet & Tin Plate Company quoted. The contract with the Phillips Company was finally closed at 5c. per box lower than the price which previously had been named by President Weir, of the Phillips Company.

Mr. Johnson gave his experience in placing contracts in previous years, when he was able several times to get lower prices than the regular quotations, but there were times when he could not do this. Of the 1905 and 1906 requirements, about 75 per cent. was obtained from the American Sheet & Tin Plate Company at the full market price and the remainder from the Wheeling Corrugating Company.

William A. Kober, Pittsburgh, purchasing agent for the H. J. Heinz Company, condiment manufacturer, said his company uses about 40,000,000 cans a year, most of which the company makes itself, buying from 75,000 to 100,000 base boxes of tin plate annually. This plate is purchased from time to time, according to the needs of the company. It is specially selected, and is coated with one pound of pure tin to the base box, differing from commercial tin plate in carrying more tin. It is bought on a basis of competitive bidding and Mr. Kober testified that the quotations submitted by the various manufacturers are usually different.

Harold H. Robertson, president Asbestos Protected Metal Company, Beaver Falls, Pa., manufacturer of building materials, such as roofing, siding and special trim, testified that his company buys 1500 to 2000 tons of sheet steel annually. When the company is in the market, it asks quotations of three or four producers and awards the contract to the concern offering the best terms. Such quotations are generally found to vary.

W. H. Foster, Youngstown, Ohio, president General Fireproofing Company, manufacturer of steel office furniture and fireproofing material, testified that his company buys about 15,000 tons of sheet steel annually. He said that competition in the sale of sheets is keen and that the bids submitted by the various makers are seldom found to agree. It has been his experience, he said, that he could obtain sheets at about $2 per ton less, on the average, than the trade paper quotations. He brought with him a table showing the prices the company has paid for sheets at various times, compared with the prices then given in the trade papers to prove his assertions. Counsel for the Government attacked this table on the ground that it compared prices paid on a specific day with prices representing the average quoted by the trade papers during a whole month.

Arthur W. Glessner, president Excelsior Steel Furnace Company, Chicago, Ill., manufacturer of heating specialties, testified that he buys annually 2000 to 3000 tons of sheets and 15,000 boxes of tin plate, including primes and wasters. He testified to active competition in the sale of all these products, saying that prices as quoted by the different manufacturers generally vary.

A Seller of Sheets Attacks Trade Paper Prices

William S. Horner, Pittsburgh district manager for the American Rolling Mill Company, Middletown, Ohio, said that his company makes and sells ingot iron, sheet steel, roofing, conductor pipe, eaves trough, culvert pipe, etc. The annual ingot capacity of the company now is 150,000 tons annually. He said that at all times the competition between his company and other companies making similar products has been active, vigorous and unrestricted, and that his company makes its own prices. In reference to prices quoted in the trade papers, Mr. Horner said that they are only approximate prices. "They are a guide," he said, "but they are not accurate."

Arthur P. Bowen, director of purchases of the Pullman Company, and up to three years ago purchasing agent of the Republic Iron & Steel Company, said that the Pullman Company purchases from 130,000 to 150,000 tons yearly. These purchases are made on a strictly competitive basis. He testified that quotations made by manufacturers of steel products vary.

How One Buyer Regards a Contract

On Tuesday Henry J. Menges, manager and buyer for the Joseph Woodwell Company, Pittsburgh, dealer in hardware and automobile supplies, testified that his company buys wire, nails, etc., placing contracts, as a rule, covering periods of 60 days. For a number of years after the Steel Corporation was formed, he said, the company bought most of its wire from the American Steel & Wire Company, "no outside companies then drumming up trade with the Woodwell Company." The Pittsburgh Steel Company was the first outside company that secured a contract from his company, about five or six years ago. Since that time there has been increasingly active competition. Mr. Menges described how the Woodwell Company uses one wire company against another in order to get low prices. Referring to contracts, he said: "During the life of the contract, if we get a lower price from anybody else we are buying from, we go to the people with whom we have the contract and say, 'If you want to get any business you have to give us a certain price.' Sometimes they do and sometimes they do not. If they do not, they don't get the business—contract or no contract."

Edward N. McKinney, of James McKinney & Sons, Albany, N. Y., testified that in the days of iron the "pools" were much more effective than in the days of steel. He said that the Carnegie Steel Company is the last to advance prices and the first to reduce them; in this way that company has a steadying effect on the market. He told about an experience he had with the Carnegie Company, in which the latter refused to accept a premium for quick delivery. He found at that time that he was unable to get quick delivery on domestic steel, but that he could get foreign steel by paying $1300 more than the American price. He offered to pay the Carnegie Company this $1300, in addition to the regular price of the steel, but the latter refused to deliver out of turn and he was thus forced to take the foreign steel. He believed this happened in 1902.

H. P. G. Nostrand, general superintendent of Rathbone, Sard & Co., Albany, N. Y., submitted tabulations showing the quotations received from various manufacturers of sheets when his firm was in the market for its requirements in different years. These tabulations showed variations in the prices quoted by the different makers.

Edward F. Grimm, buyer for the Thomas C. Jenkins Company, wholesale grocer, Pittsburgh, said that he buys from $70,000 to $75,000 worth of wire and nails for his company every year. He testified that there is keen competition in the sale of these products and that he is solicited by representatives of a number of manufacturers. The prices they quote generally vary.

John P. Provost, vice-president and secretary of the Union Electric Company, Pittsburgh, said his company buys about $100,000 worth of bare copper wire, insulated wire, lamp cord, telephone wire and strand wire annually. Ever since he began buying for his company, about 1907, prices as quoted by manufacturers of wire have shown considerable variation, there being keen competition in the sale of wire. He stated that prices always varied during the days the "pools" existed, but have varied more during the past two years. His company is now buying most of its wire from the Indiana Steel & Wire Company, as its prices are about 5 or 6 per cent. lower than what the American Steel & Wire Company is willing to sell at.

This Buyer Is Evidently Not Sales Manager

On Wednesday Joseph D. Gallagher, Glen Ridge, N. J., vice-president American Brake Shoe & Foundry Company

since 1902, and its general counsel for the past year, testified regarding the method he pursues in buying his company's requirements of plates and bars, which amount to about 10,000 or 12,000 tons annually. He said:

When I think the market is about right, or when it becomes necessary for us to contract for our requirements, I tell our purchasing agent to go ahead and get bids from all the different companies. He accordingly writes to the makers of plates and bars and receives quotations from five or six as a rule. He then negotiates with all of these companies and gets them to reduce these quotations as much as he can, and after he has got them as low as he can he turns over the quotations to me. Then I take a hack at the bidders, generally with very effective results.

Q. Do you generally succeed in forcing the companies to sell you at lower prices than they first quoted when you began negotiations with them?

A. Never since I took charge of that end of the business did I pay the price that was first asked.

Generally, Mr. Gallagher said, he placed the contracts at his own figures. He always negotiated with all the companies that submitted bids, as he never knew when any of them were at the bottom.

F. S. Landstreet, New York, vice-president Consolidation Coal Company, said his company is the second largest holder of coking coal acreage in the country. He purchases $100,000 worth of steel a year, or more, mostly bars, rails and structural shapes. He testified that there is active competition in the sale of these products.

Prepared Himself to Attack Trade Paper Prices

Clarence L. Campbell, New York City, purchasing agent of the Corn Products Refining Company, said he buys about $10,000,000 worth of all kinds of materials for his company annually, but in steel products not much outside of tin plate, running from about 270,000 to 330,000 boxes a year. On this tin plate, he said, he has always paid 5c. to 10c. less than quoted in the trade papers. He submitted tabulations of prices received from manufacturers of tin plate and the prices published contemporaneously in the trade papers. These tabulations showed that bids submitted by the manufacturers were generally lower than the prices in the trade papers. After a lengthy cross-examination, during which the witness admitted that the tabulations showed trade paper quotations published about the date on which the contracts were made, despite the fact that the companies usually quoted three or four weeks before that, Judge Dickinson objected to the tabulations on the ground that they did not show accurate comparisons.

Albert L. Lehman, vice-president and general manager Blaw Steel Construction Company, Pittsburgh, said his company does structural steel fabrication work and competes successfully with the American Bridge Company in the manufacture of steel poles and transmission towers, which products they make in common. The Blaw Company buys structural shapes, plates and sheets. This year it bought about 15,000 tons, 75 per cent. of which was shapes, most of the remainder being plates. These materials, he said, are and always have been bought by the company on a competitive basis. He said that in 1906 and 1907 his company bought over 90 per cent. of its materials from the Steel Corporation. This percentage has been constantly decreasing and in 1911 and 1912 it bought only about 10 per cent. of its requirements from the corporation.

Buys All on Bids

Charles G. Taylor, assistant purchasing agent of the Westinghouse Electric & Mfg. Company, Pittsburgh, since 1895, said the steel products which his company buys are principally bars, plates and sheets. It buys about 1000 tons of bars, 3000 tons of sheets and 1000 tons of plates annually, all on a basis of competitive bidding sometimes on contract and sometimes in odd lots, as needed. He testified that prices, as quoted by the different manufacturers, have varied considerably during the past few years. His company, he said, has a policy of distributing its purchases among a large number of manufacturers for business reasons.

On Thursday John M. Olmsted, vice-president Buffalo-Pitts Company, builder of engines, road-making machinery, etc., Buffalo, N. Y., testified that although he has always found an undercurrent of belief in the steel trade during his connection with it that prices were fixed, he had never any direct knowledge that it was being done nor had he ever found any conclusive basis to believe that a combination to maintain prices did exist. His company buys annually about 5000 tons of steel, principally bars, contracts being let after competitive bids are received.

Frederick K. Randall, general manager Brooklyn Metal Ceiling Company, Brooklyn, N. Y., testified that he purchases over 90 per cent. of his company's requirements from the American Sheet & Tin Plate Company because it makes a better quality of sheet and is prompt in deliveries. In November last he received four bids from various manufacturers, three of which were alike and one was $1 per ton under the others, and that was the only time in his experience when two makers bid the same price.

Robert M. Repp, manager Logan-Gregg Hardware Company, Pittsburgh, Pa., testified that the printed price lists sent out by various manufacturers of poultry netting usually quoted the same prices. Generally, however, he buys below these published prices.

Charles T. Marsh, purchasing agent of the Gulf Refining Company and the Gulf Pipe Line Company, Pittsburgh, Pa., testified as to keen competition among pipe and wire rope manufacturers. He buys annually 12,000 to 15,000 tons of pipe and about 600,000 ft. of wire rope.

On Friday, George Heard, president Natural Gas Company of West Virginia, Pittsburgh, Pa.; Fred L. Haws, purchasing agent Treman, King Co., Ithaca, N. Y.; Davis N. Glass, purchasing agent Booth & Flynn, contractors, Pittsburgh, and Dillworth B. McClelland, vice-president Spang, Chalfant & Co., Pittsburgh, testified as to active competitive conditions.

The hearings were then adjourned until January 5, when they will be resumed at Atlanta, Ga.

Supply and Machinery Manufacturers' Convention

The 1914 convention of the American Supply and Manufacturers' Association will be held at the New Greenbrier Hotel, White Sulphur Springs, W. Va., June 15, 16 and 17. F. D. Mitchell, secretary-treasurer of the association, announces that indications already point to one of the best attended and most successful meetings ever held. Manufacturers not members of the association, and supply and machinery dealers generally, are being invited to attend the convention regardless of their affiliations. Through an error or misunderstanding, the manager of a hotel in Houston, Texas, sent to all the members of the American Supply and Machinery Manufacturers' Association a letter in which is was intimated that the association would hold its convention in that city in April. D. K. Swartwout, Ohio Blower Company, Cleveland, Ohio, president of the association, to offset the erroneous impression that this letter might create, has sent a communication to the Houston hotel manager in which he asks that full publicity be given to a denial of the misleading information. A copy of Mr. Swartwout's letter was sent out with the official convention notice. A week before the American Supply and Machinery Manufacturers' Association meets at White Sulphur Springs, the American Hardware Manufacturers' Association and the Southern Hardware Jobbers' Association will meet there in joint convention, also at the New Greenbrier Hotel. Many members of these two latter organizations are expected to remain for the convention of the supply and machinery men in view of the fact that about 50 members of the Hardware Manufacturers' Association are members also of the American Supply and Manufacturers' Association.

The Wing-Meyers Foundry Company, Columbus, Ohio, has been reorganized and its capital stock increased to $20,000. The company has moved to the building formerly occupied by the Columbus Machine Company on West Broad street, which is being fitted with modern foundry equipment. Charles Wing is president; C. Meyers, vice-president, and J. E. Snyder, secretary and treasurer.

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The New Level in Steel Prices

In the early months of the thoroughly competitive market in steel products that followed the famous announcement of May, 1911, there were signs that the leading manufacturers were not quickly unlearning all the lessons of the co-operative period. There was a quite general disposition, and it was much commented upon at the time, to try out the situation, but not to plunge into an indiscriminate scramble for tonnage on what looked like a 70 to 75 per cent. market. But by the end of 1911 it began to appear that another restocking movement like that of 1909 could be stimulated by low prices, and buying broke out for distant deliveries. An interval of hesitation at the opening of 1912 was followed by further heavy contracting at prices even lower than those of late 1911, deliveries in many cases extending into the early months of 1913.

Sellers have had many occasions to regret their haste to load up with this low-priced business. Yet it is perfectly clear that the opportunity for any producer to sell at the premium prices prevailing from September, 1912, to May of this year was due to this very overloading of some of the larger manufacturers in certain lines, particularly in bars, plates and structural shapes. At the same time, there is just now an amount of resistance among producers to low-priced contracts, that is in marked contrast with the condition in 1911 when some of the odor of co-operation was still in the air.

It remains to be seen how deep an impression was made by the experiences of last year. Some of the paper protestations made by sellers in recent months as to the integrity of extras have been put to the test lately and not always have they stood it. While buyers wait, courageous leadership, with strength equal to its courage, could do much, but this is no friendly day for any such leadership. Announcements from various sellers that they would not now sell ahead at the prices made two years ago have helped to create a sentiment, and the fact that buyers have no such desire to contract as they showed two years ago has saved the situation from demoralization. Conditions conspire to prevent long commitments. At the moment sellers more than buyers are the source of pressure on the market. The next three months will show whether a new salesmanship is gaining a foothold in the steel trade, bringing with it some of the benefits commonly claimed for co-operation.

Tin Plate Imports and Lower Tariff

Cabled reports of recent sales of Welsh tin plate in the United States due to the reduced tariff are entitled to little credence. Whether all the sales by Welsh mills to consumers in this country for shipment in 1914 foot up to the 40,000 tons reported or, as is likely, to a much smaller amount, all are classed as drawback plates. The low prices at which contracts have been made in the past two months by the large consumers of tin plates in this country have left no chance for domestic use of the Welsh product. The reduced tariff has had its effect upon the market undeniably, but rather in the reduction of the home price than in the admission of foreign plates. Domestic tin plate manufacturers have not yet accepted the new tariff in the way laid out for them by the leader of the House at Washington. His answer to all protests of our iron and steel manufacturers was that they should be willing to relinquish a certain percentage of

their former output in order that the Government might derive revenue from the foreign products that came in to displace it. But somehow these manufacturers have the notion that the buying power of a nation is not increased by sending business to foreign mills, and that even our ability to import, on which the builders of the present tariff set such store, is dependent on the amount of work given employees of American mills.

Drafting Room Losses

One thing that has impressed itself strongly upon observers in connection with machinery building, bridge and structural design and similar work is the great amount of preventable loss in the drafting room. This arises not so much from waste of time or material as from the constant changes that are usually going on in the drafting force.

Most draftsmen are employed on a time basis, at so much per hour, the rates of pay being based upon their relative skill and efficiency, as indicated by what they have been able to obtain elsewhere. When work is plentiful the drafting rooms are filled; when it falls off a certain number of the men are let go. Following a falling off in demand a few bright, progressive young fellows ordinarily manage to hang on, and they gradually win promotion, being given more and more important work and higher rates of pay.

At length, however, there comes a time when the company they are working for will not pay any more, and the only course open to these ambitious employees is to find positions elsewhere. With some other company they can usually start in at the same or a better rate and work up again until the limit there, too, has been reached, when the process must be repeated with still another concern. While employed with the first of the companies these draftsmen had to acquire experience, naturally at the company's expense, and to become acquainted with its methods before their work got to be of any great value. In other words, their education had cost certain definite sums of money, all of which was thrown to the wind when they left. The expenditure had to be incurred all over again with other beginners.

No small part of the cost of this education consists of losses and delays from the mistakes made by young draftsmen, either inadvertently or through trying out ideas of their own, which are not caught in the checking and get passed along to the shops or even the erecting force. The greatest source of loss, however, is in the ideas and specific knowledge of a company's products which are carried away to succeeding employers, who are frequently, if not usually, direct competitors. Ambitious young draftsmen are naturally students of machine or structural design, and they absorb ideas as a sponge does water; they want to know the reason for everything they are working on, and they ordinarily manage to learn it. Devices for preventing this, such as having the drawings made separately in parts or left with certain vital details to be filled in by the chief draftsman, seldom afford the protection intended. Every young draftsman, also, wants to have a copy of any important work upon which he has been engaged, and securing and carrying away extra blueprints is a far easier matter than most managers imagine.

An important consideration is the fact that the best of these young draftsmen, in probably a majority of instances, are graduates of technical schools or universities and have taken up work in the drawing room as a stepping-stone to positions in the engineering and sales departments. For such positions, where aptitude is shown, they make the best possible material, as they are acquainted with the firm's designs and methods and have less to unlearn than young engineers or salesmen brought in from the outside. Really good men for either department, content to work on moderate salaries, are really difficult to obtain and it is, therefore, the hight of extravagance to let any promising material get away. Not a few companies, including some of the largest producers of metal or machinery, have realized the needs of the situation sufficiently to inaugurate systems for retaining and promoting capable draftsmen; while others have so-called students' courses, which include successive training of technical graduates in the shops, drafting rooms and engineering or sales departments. The idea is one that should be taken hold of far more generally than it is at the present time.

A Complication of Workmen's Compensation

Small employers of labor in Connecticut are concerned in the operation of the workmen's compensation act, which goes into effect January 1, in a way not paralleled in the application of other like statutes. While the law is very similar in its wording to those recently enacted in other States, a ruling of the State attorney-general gives it a somewhat sinister meaning. Its provisions are made to apply to all employers of labor, large and small, providing they do not take the precaution to serve formal notice on their employees that they choose to be exceptions and prefer to retain the present status as regards financial liability for accidents.

Part A of the act states very clearly that the employer who does not accept the compensation principle is deprived of the old defenses of contributory negligence and negligence of fellow workmen, and this part applies only where five persons or more are employed. Part B provides that all employers are presumed to accept compensation unless they shall serve notice to the contrary on their employees, and the provision regarding "five employees or more" is not repeated unless, as many maintain, it is by inference. The attorney-general, therefore, infers that this part of the act applies to everyone. In case of accident the employer of a single laborer must pay compensation, regardless of the source of negligence, unless he shall have served the notice required by law. Some very able lawyers who have made a special study of workmen's compensation and the laws governing it, do not agree with the ruling of the attorney-general. They point out the results of the operation of similar laws in other States, as indicated by the court decisions. They argue that parts A and B of the act are dependent one upon the other; that the separation of the act into parts does not mean that the intention of the legislature in excepting the small employer was made less clear. In the Massachusetts law, for example, which has been in operation for several years, Part B does not specifically mention the limit of number of employees, yet it has never been contended that any doubt of the intention exists. Of course, in Connecticut the ruling means only some degree of trouble in procuring the necessary form, filling it out and serving it upon employees, and repeating the task when others are hired—provid-

ing the owner is familiar with the law. But to omit the formality, through neglect or ignorance, may prove financially serious in case of an accident. The matter will soon find its way into court, it is expected, for a final interpretation.

Effect of New Iron and Steel Tariff

Chairman Topping Believes It Has Intensified Market Reaction—The Labor Side

In an interview given the Wall Street Journal, New York, in response to its inquiry concerning the effect on the domestic industry of the reduction of iron and steel duties, John A. Topping, chairman of the Republic Iron & Steel Company, commented as follows:

"Tariff revision has unquestionably stimulated and hastened liquidation and brought about demoralization of prices through foreign competition at seacoast points. As a result there are now out of employment, or on reduced pay, not less than 250,000 men employed in the steel and iron industry, and in addition to this loss of labor, recent treasury returns indicate a further loss in revenues on imports of approximately $4,500,000 per month.

"While the American manufacturer has not abandoned seacoast markets, yet to hold these markets, on account of the high labor and transportation costs, profits have been sacrificed, and it necessarily follows that if present conditions should be long continued, or should lower prices from abroad confront us, wage reductions are inevitable. The steel business of today is practically on a free trade basis, many products being on the free list and the heavy tonnage products nominally protected. It should therefore be quite apparent to all that our markets, both for labor and commodities, will more closely follow foreign developments hereafter.

"There are some who maintain that our present wage schedules will not be involved on account of the high efficiency of our labor. The absurdity of this claim should be apparent to practical minds, particularly when it is considered that our domestic labor rates in the iron and steel trade are from 150 per cent. to 300 per cent. higher than those paid by our chief competitors abroad. Then again, it is claimed that labor-saving devices will be utilized to an extent that will equalize our labor cost of production and that other economies in the process of manufacture will be developed to offset our high per diem rates in the labor of producing; and to such claims the answer is that American manufacturers have already accomplished much in respect to making their labor efficient and that efforts toward higher efficiency will doubtless be resisted by labor unions, as efficiency, in the ordinary sense, only means increasing the unit of production per man or in speeding up.

"Further improvement unquestionably will be made in introducing additional labor-saving devices and improved processes; but in the march of progress Europe and America, on account of the closer competitive conditions existing, will more likely go hand in hand, and commodity prices as well as labor rates will hereafter be maintained on more nearly a parity.

"Owing to the great disparity between the rates here and abroad, it will, therefore, be reasonable to expect that unless commodity prices abroad advance, labor prices here at home must decline. So far as our mechanical devices and metallurgical practice are concerned, American methods challenge comparison. We have not, however, been as progressive as Germany in the conservation of fuel and waste products, for the reason that the cheaper coal and coke we enjoy made investments of capital, until recently, in such devices as suggested economic refinement, less profitable than to Germans whose fuel cost was, and is now, considerably in excess of ours. During recent years, however, the more important steel manufacturers of this country have introduced gas engines, by-product coke process, electric motors and cranes, to such an extent that the difference in equipment and process as between the progressive American manufacturer and the best equipped German works is not material.

"As to the final effect of low tariff on iron and steel, I believe that, after we have made proper readjustments of our labor costs, unless discouraged by antagonistic legislation, our markets will be broadened and also made more stable by minimizing price fluctuations, the tendency of which should be, in this event, to greater stability in the earning power of steel securities. Labor, however, while possibly sharing in some reductions in the cost of living, will obtain less to live on unless labor abroad enjoys more for its living."

The Carnegie Steel Company Will Sell Ferromanganese

The Carnegie Steel Company, Pittsburgh, has entered the market as a seller of 80 per cent. ferromanganese and has already taken several contracts for delivery early next year. It has been some years since this company sold ferromanganese in the open market. It has arranged to make this product at its Lucy and Isabella furnaces in the Pittsburgh district. It has also been arranged to make it at Birmingham, Ala., and it will also be made by the Illinois Steel Company at South Chicago. The Carnegie Company expects to supply a good part of the domestic demand for ferromanganese in the Central West and in the South. It will also probably take business for delivery near seaboard points in competition with foreign makers, providing the prices it can obtain for such delivery are satisfactory.

The company will take contracts for ferromanganese from consumers for their requirements, and prices will be adjusted from month to month, as has been the case in the contracts made for sheet bars, plates and other products. The price will be adjusted about the 20th of each month for shipments in the following month. This will be an advantage to domestic consumers of ferromanganese, as they can place contracts for their requirements and will not be compelled to buy specified tonnages at a fixed price and for long periods ahead, as is the case when buying foreign.

The entrance of the company into the market as a seller of domestic ferromanganese means that a large tonnage of foreign, that has been going to the Central West for some years, will be displaced. It is probable that the price for domestic ferromanganese will be somewhat less than the seaboard price for foreign, plus freight to point of delivery.

British Pig Iron and Steel in 1913 and 1912

The British Iron Trade Association statistics for 1912, just issued, are cabled to *The Iron Age* this week. Pig-iron production was 8,889,000 gross tons. Of Bessemer steel ingots the output was 1,522,000 tons, and of open-hearth steel, 5,274,000 tons. These figures compare with 9,718,638 tons of pig iron in 1911, as shown by the British Iron Trade Association's figures, 1,461,140 tons of Bessemer ingots and 5,000,472 tons of open-hearth ingots. Thus pig iron fell off 830,000 tons in 1912, while Bessemer ingots gained 60,000 tons and open-hearth ingots 274,000 tons.

The statistics for the first half of 1913 are also just published. They show 5,411,000 gross tons of pig iron, or at the rate of 10,822,000 tons a year; 888,000 tons of Bessemer ingots, or at the rate of 1,776,000 tons, and 3,206,000 tons of open-hearth ingots, or at the rate of 6,412,000. While the second half of 1913 showed a falling off, the total for the year promises to be one of the largest on record, both in pig iron and steel.

The sale of the assets of the bankrupt Beaver Dam Malleable Iron Company, Beaver Dam, Wis., which was scheduled for December 8 and at that time postponed to December 11, was finally set for January 3, 1914, at the works in Beaver Dam, by order of the referee of the United States District Court, Milwaukee. The report of the appraisers gives the value of the three works at Beaver Dam, including real estate, equipment, machinery, finished and unfinished product, supplies, etc., at $557,237.65. The works are in full operation under the direction of Ernest E. Smythe, Milwaukee, trustee and receiver.

The furnace of the Oriskany Ore & Iron Corporation, at Lynchburg, Va., has been banked for the past ten days.

Hatters' Union Again Loses in Danbury Case

The United States Circuit Court of Appeals affirmed, December 18, the judgment of the Connecticut District Court in the famous Danbury hatters' case. It awarded to D. E. Loewe & Co. damages of $272,000 against the United Hatters of North America on the ground that the boycott and conspiracy carried on by the union against the plaintiffs was a violation of the Sherman anti-trust law. This case began in 1902, and when it first came to trial Loewe & Co. received a judgment for $232,340. That verdict was set aside on appeal and a new trial ordered. This resulted in a verdict for the plaintiffs for $252,130, and again an appeal was taken. It is this second appeal which has just been decided. In sustaining the decision of the lower court Judge Coxe said in part:

"That the anti-trust act is applicable to such combinations as are alleged in the complaint is no longer debatable. The law makes no distinction between the classes, employers or employees, corporations or individuals. Rich and poor alike are included under its terms. The Supreme Court particularly points out that, although Congress was frequently importuned to exempt farmers' organizations and labor unions from its provisions, these efforts all failed and the act still remains.

"No one disputes the proposition that labor unions are lawful. All must admit that they are not only lawful but highly beneficial when legally and fairly conducted, but, like all other combinations, irrespective of their objects and purposes, they must obey the law."

New Indiana Manufacturers' Organization

A new organization of manufacturers, absorbing the Indiana Manufacturers' Association and the Indiana Manufacturers' and Shippers' Association, to be known as the Indiana Association of Manufacturers and Commerce, has been organized in Indianapolis. The following are the officers: President, B. A. Van Winkle, Hartford City Paper Company; first vice-president, Henry Clemens, Cannelton Sewer Pipe Company; second vice-president, H. C. Atkins, E. C. Atkins & Co.; treasurer, George O. Rockwood, Rockwood Mfg. Company. Directors are James English, Republic Iron & Steel Company; Thomas Bauer, Lafayette Box Board Company; J. M. Heron, Rex Buggy Company; B. F. von Behren, Von Behren Mfg. Company; S. E. Swayne, Robinson & Co.; Lee Rodman, Indiana Cotton Mills; M. W. Mix, Dodge Mfg. Company; W. H. Morsches, Nicholson File Company; W. H. Weitnecht, Lehigh Portland Cement Company; C. H. Barnaby, Barnaby Lumber Company; John E. Fredericks, Kokomo Steel & Wire Company, and A. M. Glossbrenner, Levey Bros. & Co. The secretary of the association will be chosen by the board of directors at a meeting in January. The association will aid the manufacturers of the State in acting on legislative and other questions affecting their interests.

The Virginia Pig-Iron Rate Case

Testimony was taken at Washington, on Monday, December 22, before Ward Prouty, examiner, in the complaint brought before the Interstate Commerce Commission by Virginia pig-iron producers against the various railroads which carry Virginia pig iron to Eastern consuming districts. The data submitted included compilations of rates on pig iron from Virginia points to Philadelphia, New York harbor, Boston and other cities on and near the seaboard, comparisons being made with the rates from furnaces in the Pittsburgh, Buffalo and western Pennsylvania districts. The rate of $2.45 from Pittsburgh to New York, for example, was compared with $3.95 from Virginia furnace to New York, both rates including lighterage. The discrimination alleged by the Virginia furnace companies was made more striking by comparing rates per ton mile from various competitive points. From Pittsburgh to Boston this figures out 4 mills; from other western Pennsylvania points 4.1 and 4.2 mills, and from Buffalo 4.9 mills. From Virginia furnace points it is 5.8 mills. The oral argument of the case will probably not be made before spring and a decision may not be reached for four or five months.

Annual Meeting of Brass Manufacturers

The National Association of Brass Manufacturers held its annual meeting at the Hotel Astor, New York City, December 10 and 11. A uniform thread was adopted for the tail piece or shank of all ball cocks, in which the co-operation of all manufacturers, especially tank manufacturers who make ball cocks, is solicited, whether members or non-members. The association ratified the work so far done by the list committee on the official catalogue and price list that is to be issued January 1, 1915, in which many types or styles of goods that time and progress in the plumbing line have rendered obsolete will be supplanted by others. A notice of this will be issued to all manufacturers and jobbers in the United States and Canada at the earliest opportunity, giving detailed information. Should anyone have catalogue work in hand, it would be well for him to communicate with Commissioner William M. Webster, 1805-1818 City Hall Square Building, Chicago, Ill., for further particulars. The list committee is considering the question of establishing uniform thread on all ¾-in. hose couplings, in which the co-operation of the manufacturers in that line is also solicited.

It being the annual meeting, the following officers were elected: President and chairman board of trustees, C. C. Hale, Peck Bros. & Co., New Haven, Conn. Board of trustees, W. H. Wasweyler, Milwaukee Brass Mfg. Company, Milwaukee, Wis.; A. S. Hills, Haydenville Company, Haydenville, Mass.; A. Mueller, H. Mueller Mfg. Company, Decatur, Ill.; C. H. Downs, E. Stebbins Mfg. Company, Springfield, Mass.; S. Jacobson, Burlington Brass Works, Burlington, Wis.; E. Rickersberg, Rickersberg Brass Company, Cleveland, Ohio; Harold Wolff, L. Wolff Mfg. Company, Chicago, Ill.; Theodore Ahrens, Standard Sanitary Mfg. Company, Pittsburgh, Pa. Representatives on national committee, H. J. Geuringk, Sanitary Company, Cleveland, Ohio; A. Y. McDonald, A. Y. McDonald Mfg. Company, Dubuque, Iowa.

As the business of the meeting was about concluded, it was brought to an abrupt and sad termination by the announcement of Commissioner Webster that Charles B. McCanna, president Burlington Brass Works and Burlington National Bank, Burlington, Wis., who was attending the meeting, had died suddenly from heart failure.

Proposed Kahn Patent Law Amendments

A bill entitled H. R. 10,310 has been introduced in the House of Representatives by Representative Robert J. Bulkley, of Ohio, covering amendments to the objectionable sections of the Kahn law relative to trademarks, patents and copyrights on goods exhibited at the Panama-Pacific Exposition. The National Design Registration League, of which S. M. Weatherly, 1039 Race street, Philadelphia, is secretary, states that these amendments have been carefully drawn and have the approval of able lawyers and other authorities. They are consistent with the interests of American manufacturers, merchants and importers, and at the same time afford adequate protection to foreign exhibitors at the exposition. The request is made that Senators and Representatives in Congress should be written to and urged to support this measure when it comes up for action.

International Specifications on Cast Iron

A meeting was held in London, December 9, of the committee of the International Association for Testing Materials dealing with specifications for pig iron and iron castings. The United States was represented by Dr. Richard Moldenke and Walter Wood. The British members are Dr. J. E. Stead and F. W. Harbord. London papers say that the proceedings were not public, but that certain proposals representing the views of American and German producers are to be circulated among British makers of pig iron, cast iron pipe and miscellaneous iron castings, with a view to getting a consensus of opinion.

The blast furnace of the Globe Iron Company, Jackson, Ohio, which has been out for relining, is scheduled to blow in this week.

The Iron and Metal Markets

Many Steel Works Shut Down

UNPARALLELED HOLIDAY IDLENESS

Steel Corporation a Seller of Ferromanganese—Eastern Buying of Basic Iron

The holiday shut-down of iron and steel works which began Wednesday night has probably not been equaled in length or in the number of plants involved. The Steel Corporation has closed down practically all of its Northern steel works and rolling mills and they will remain idle until January 2. Most of its blast furnaces in the Central West and the Chicago district will be banked for the same time. Steel companies generally are making a similar curtailment. In some cases the shut-downs began December 20 and will last until January 5.

The finished steel market has grown quieter and little is expected from the last week of the year. At the same time inquiries are not wanting, and certain classes of manufacturing consumers have been sounding sellers as to the contract basis for the first half of 1914.

Reports are not all one way as to the attitude of the steel companies. In the chief tonnage group of bars, plates and shapes no contracting for the first half of 1914 is reported and very little for the first quarter. Buyers do not consider 1.20c., Pittsburgh, attractive, but rarely has a lower price been made except for early delivery. In some cases extended deliveries have been granted at current prices where the tonnage was not large.

The whole situation turns on the country's consumption. This has been steadily declining, but the rate of decline has been obscured by drafts upon stocks of both jobbers and manufacturers. The drastic cut in railroad buying is well known and the steel trade has ceased to make calculations as to its resumption, in view of the special influences at work.

Rail orders, therefore, may be longer delayed than was thought a month ago, and the prospects of repeating the early winter rollings of recent years are not brilliant. Of the car business recently talked of, orders for 1000 freight cars and 125 passenger equipment cars have just been distributed by the Grand Trunk.

Structural mills have gone into keener competition on the small amount of construction work now coming out. In the East plain material has sold at $1 to $2 below a 1.20c., Pittsburgh, basis. Two Eastern contracts just let have taken 5000 tons of concrete reinforcement bars.

Prices on wire products and sheets have been crowded down uncomfortably close to cost for some producers. Sheet bookings have improved slightly, but prices on tin mill products have weakened further. In wire products recent Eastern transactions show cuts of $2 a ton below the $1.55, Pittsburgh, basis for nails.

The city of Ottawa, Canada, will open bids February 3 on 87 miles of 51 to 58-in. riveted steel pipe. Inquiries from riveted pipe makers are being received for the plates required for this work, which will be over 50,000 tons.

There is much interest in the coming of the Steel Corporation into the market as a seller of ferromanganese, after many years of limiting its output to its own requirements. Sales already made, including one of 1000 tons and one of 1500 tons, mean that the foreign product must be delivered at the seaboard considerably below the present price of $47 if it is to penetrate to the Central West.

The largest pig iron selling of the week has been in the East. Of basic iron the chief sales were 6000 tons for Connecticut, 12,000 tons for central Pennsylvania, and 15,000 to 20,000 tons for the Philadelphia district. At $14.25, eastern Pennsylvania, the decline was 50 cents a ton since the last sales.

Foundry iron markets are dull and dragging. At Chicago there is some quiet negotiating, but the average buyer holds aloof. Foundry work has been dropping off and there is sharp figuring on castings contracts for 1914. Southern iron at $10.50 to $11, Birmingham, for No. 2 continues to be from $1 to $2 higher than the delivered prices of Northern iron in Ohio and Michigan. At Pittsburgh two foundry interests are in the market for a total of 10,000 tons. Several Valley furnaces will blow out in the next 10 days.

A Comparison of Prices

Declines in Italics

At date, one week, one month, and one year previous

	Dec. 24, 1913.	Dec. 17, 1913.	Nov. 26, 1913.	Dec. 24, 1912.
Pig Iron, Per Gross Ton:				
Foundry No. 2 X, Philadelphia..	*$15.00*	$15.25	$15.50	$18.50
Foundry No. 2, Valley furnace.	*13.00*	13.50	13.50	17.50
Foundry No. 2 S'th'n, Cin'ti...	13.75	13.75	13.75	17.25
Foundry No. 2, Birmingham, Ala.	10.50	10.50	10.50	14.00
Foundry No. 2, furnace, Chicago*	14.00	14.00	14.75	18.00
Basic, delivered, eastern Pa....	*14.25*	15.00	15.00	18.25
Basic, Valley furnace	12.75	12.75	12.85	16.50
Bessemer, Pittsburgh	15.90	15.90	15.90	18.15
Malleable Bessemer, Chicago*...	14.50	14.50	14.75	18.00
Gray forge, Pittsburgh.....	13.90	13.90	14.25	17.15
Lake Superior charcoal, Chicago	15.25	15.25	15.25	18.75
Billets, etc., Per Gross Ton:				
Bessemer billets, Pittsburgh.....	20.00	20.00	20.50	27.00
Open-hearth billets, Pittsburgh..	20.00	20.00	20.50	28.50
Open-hearth sheet bars, P'gh....	21.00	21.00	21.00	29.00
Forging billets, Pittsburgh.....	24.00	24.00	26.00	35.00
Open-hearth billets, Philadelphia	22.40	22.40	22.90	32.00
Wire rods, Pittsburgh.....	25.00	25.00	25.50	30.00
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	13.00	13.00	13.50	17.25
Iron rails, Philadelphia.....	15.50	15.50	17.00	18.00
Carwheels, Chicago.....	*11.50*	12.00	12.00	17.00
Carwheels, Philadelphia	12.00	12.00	12.00	16.00
Heavy steel scrap, Pittsburgh...	*10.75*	11.00	11.25	14.75
Heavy steel scrap, Philadelphia.	10.00	10.00	10.00	14.50
Heavy steel scrap, Chicago.....	9.00	9.00	9.50	12.50
No. 1 foundry cast, Pittsburgh..	12.00	12.00	12.00	14.50
No. 1 foundry cast, Philadelphia	12.00	12.00	12.50	15.00
No. 1 f'dry cast, Ch'go (net ton)	**10.00**	9.75	10.00	13.00

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

	Cents.	Cents.	Cents.	Cents.
Finished Iron and Steel, Per Pound to Large Buyers:				
Bessemer rails, heavy, at mill...	1.25	1.25	1.25	1.25
Iron bars, Philadelphia.....	1.22½	1.22½	1.27½	1.67½
Iron bars, Pittsburgh	1.35	1.35	1.40	1.70
Iron bars, Chicago	1.10	1.10	1.15	1.57½
Steel bars, Pittsburgh.....	1.20	1.20	1.25	1.70
Steel bars, New York.....	1.36	1.36	1.41	1.86
Tank plates, Pittsburgh.....	1.20	1.20	1.25	1.75
Tank plates, New York.....	1.36	1.36	1.41	1.91
Beams, channels & angles, P'gh..	*1.20*	1.25	1.25	1.75
Beams, channels & angles, N. Y.	*1.31*	1.41	1.41	1.91
Skelp, grooved steel, Pittsburgh.	1.20	1.20	1.25	1.45
Skelp, sheared steel, Pittsburgh.	1.30	1.30	1.35	1.50
Steel hoops, Pittsburgh.....	*1.35*	1.40	1.45	1.50
Sheets, Nails and Wire, Per Pound to Large Buyers:				
Sheets, black, No. 28, Pittsburgh	1.90	1.90	1.95	2.25
Galvanized sheets, No. 28, P'gh.	2.90	2.90	2.95	3.40
Wire nails, Pittsburgh.....	1.55	1.55	1.55	1.75
Cut nails, f.o.b. Eastern mills...	1.65	1.65	1.65	1.75
Cut nails, Pittsburgh	1.55	1.55	1.55	1.70
Fence wire, ann'l'd, 0 to 9, P'gh.	1.35	1.35	1.35	1.55
Barb wire, galv., Pittsburgh....	1.95	1.95	1.95	2.15

Coke, **Connellsville,**

Per Net Ton at Oven:	Dec. 24, 1913.	Dec. 17, 1913.	Nov. 26, 1913.	Dec. 24, 1912.
Furnace coke, prompt shipment.	$1.75	$1.75	$1.75	$4.00
Furnace coke, future delivery...	**1.85**	1.80	1.90	3.25
Foundry coke, prompt shipment.	2.50	2.50	2.50	4.50
Foundry coke, future delivery..	2.60	2.60	2.75	4.00

Metals,

Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.....	14.62½	14.75	15.50	17.62½
Electrolytic copper, New York..	14.37½	14.37½	14.75	17.50
Spelter, St. Louis.....	5.00	5.00	5.10	7.15
Spelter, New York.....	5.15	5.15	5.25	7.30
Lead, St. Louis.....	3.95	3.85	4.15	4.12½
Lead, New York.....	**4.10**	4.00	4.30	4.27½
Tin, New York	36.65	37.75	39.50	50.15
Antimony, Hallett's, New York..	7.00	7.00	7.12½	9.50
Tin plate, 100-lb. box, Pittsburgh	$3.40	$3.40	$3.40	$3.60

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh, in carloads, per 100 lb., New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier, 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.20c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers with extras:

Rectangular plates, tank steel or conforming to manufacturer's standard specifications for structural steel dated February 6 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.....	.10
Gauges under 3-16 in. to and including No. 8.....	.15
Gauges under No. 8 to and including No. 9.....	.25
Gauges under No. 9 to and including No. 10.....	.30
Gauges under No. 10 to and including No. 12.....	.40
Sketches (including straight taper plates) 3 ft. and over	.10
Complete circles 3 ft. in diameter and over.....	.20
Boiler and flange steel.....	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel.....	.30
Marine steel.....	.40
Locomotive firebox steel.....	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.	1.00
Cutting to lengths, under 3 ft., to 2 ft., inclusive.....	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.20c. to 1.25c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.....	.10
H-beams over 18 in.....	.10
Angles over 6 in. on one or both legs.....	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick as per steel bar card, Sept. 1, 1909.....	.70
Tees, structural sizes (except elevator, hand rail, car-truck and conductor rail).....	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909..... .20 to	.80
Deck beams and bulb angles.....	.30
Hand rail tees.....	.75
Cutting to lengths, under 3 ft., to 2 ft. inclusive.....	.25
Cutting to lengths, under 2 ft., to 1 ft. inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55

No charge for cutting to lengths 3 ft. and over.

Wire Rods—Bessemer, open-hearth and chain rods, $25 to $25.50.

Wire Products.—Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.35; galvanized, $1.75. Galvanized barb wire and fence staples, to jobbers, $1.95; painted, $1.55. Wire nails, to jobbers, $1.55. Prices of the foregoing wire products to dealers, in carload lots, are 5c. higher. Woven wire fencing, 74½ per cent. off list for carloads; 73½ off for 1000-rod lots; 72½ off for less than 1000-rod lots.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12 & 12½	13	14	15	16
Annealed	$1.55	$1.60	$1.65	$1.70	$1.80	$1.90	$2.00	$2.10
Galvanized	2.00	2.00	2.05	2.10	2.20	2.30	2.70	2.80

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe in effect from October 27, 1913, and iron pipe from June 2, 1913, all full weight:

Butt Weld.

Steel. Inches.	Black	Galv.	Iron. Inches.	Black	Galv.
⅛, ¼ and ⅜.....	73	52½	⅛ and ¼.....	66	47
½	77	66½	⅜	65	46
¾ to 3.....	80	71½	½	69	56
			¾ to 2½.....	72	61

Lap Weld.

2	77	68½	1¼	56	45
2½ to 6.....	79	70½	1½	67	56
7 to 12.....	76	65½	2	68	58
13 to 15.....	53		2½ to 4.....	70	61
			4½ to 6.....	70	61
			7 to 12.....	68	55

Reamed and Drifted.

1 to 3, butt.....	78	69½	1 to 1½, butt.....	70	59
2, lap.....	75	66½	2, butt.....	70	59
2½ to 6, lap.....	77	68½	1¼, lap.....	54	43
			1½, lap.....	65	54
			2, lap.....	66	56
			2½ to 4, lap.....	68	59

Butt Weld, extra strong, plain ends.

⅛, ¼ and ⅜.....	68	57½	⅜	63	52
½	73	66½	½	67	60
¾ to 1½.....	77	70½	¾ to 1½.....	71	62
2 to 3	78	71½	2 and 2½.....	72	63

Lap Weld, extra strong, plain ends.

2	74	65½	1½	65	59
2½ to 4.....	76	67½	2	66	58
4½ to 6.....	75	66½	2½ to 4	70	61
7 to 8.....	68	57½	4½ to 6.....	59	60
9 to 12.....	63	52½	7 and 8.....	63	53
			9 to 12.....	58	47

Butt Weld, double extra strong, plain ends.

½	63	56½	½	57	49
¾ to 1½.....	66	59½	¾ to 1½.....	60	52
2 to 2½.....	68	61½	2 and	..	54

Lap Weld, double extra strong, plain ends

2	64	57½	2	55	49
2½ to 4	66	59½	2½ to 4.....	60	54
4½ to 6.....	65	58½	4½ to 6.....	59	53
7 to 8.....	58	47½	7 to 8.....	52	42

To the large jobbing trade an additional 5 and 2½ per cent. is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads on lap-welded steel, in effect from May 29, 1913, and standard charcoal-iron boiler tubes, in effect from January 1, 1913, are as follows:

Lap-Welded Steel.		*Standard Charcoal Iron.*	
1¾ and 2 in.....	60	1½ in.....	44
2¼ in.....	57	1¾ and 2 in.....	48
2½ and 2¾ in.....	63	2¼ in.....	44
3 and 3¼ in.....	67	2½ to 2¾ in.....	53
3½ to 4½ in.....	69	3 and 3¼ in.....	55
5 and 6 in.....	63	3½ to 4½ in.....	58
7 to 13 in.....	60	Locomotive and steamship special grades bring higher prices.	

2½ in. and smaller, over 18 ft., 10 per cent. net extra.

2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft., and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets.

	Cents per lb.
Nos. 3 to 8	1.40 to 1.45
Nos. 9 and 10	1.45 to 1.50
Nos. 11 and 12	1.50 to 1.60
Nos. 13 and 14	1.55 to 1.65
Nos. 15 and 16	1.65 to 1.70

Box Annealed Sheets, Cold Rolled.

Nos. 10 and 11	1.55 to 1.60
No. 12	1.55 to 1.60
Nos. 13 and 14	1.60 to 1.65
Nos. 15 and 16	1.65 to 1.70
Nos. 17 to 21	1.70 to 1.75
Nos. 22 and 24	1.75 to 1.80
Nos. 25 and 26	1.80 to 1.85
No. 27	1.85 to 1.90
No. 28	1.90 to 1.95
No. 29	1.95 to 2.00
No. 30	2.05 to 2.10

Galvanized Sheets of Black Sheet Gauge.

Nos. 10 and 11	1.90 to 1.95
No. 12	2.00 to 2.05
Nos. 13 and 14	2.00 to 2.05
Nos. 15 and 16	2.15 to 2.20
Nos. 17 to 21	2.30 to 2.35
Nos. 22 and 24	2.45 to 2.50
Nos. 25 and 26	2.60 to 2.65
No. 27	2.75 to 2.80
No. 28	2.90 to 2.95
No. 29	3.05 to 3.10
No. 30	3.20 to 3.25

... & SONS,
Mechanical and Civil Engineers,
PITTSBURGH, PA.

Pittsburgh

PITTSBURGH, PA., December 24, 1913. (*By Telegraph.*)

The holiday week finds a condition of extreme quietness prevailing in the steel trade and this will continue into January. Many iron and steel plants in this district are closed down, to remain idle until next week and in some cases until the first Monday in January. There are indications of a buying movement in January, but the most unsatisfactory feature is that the railroads are placing practically no orders for steel cars or track material. The impression prevails that they are holding back their orders until after the Interstate Commerce Commission has rendered a decision on freight rates. The opinion is growing that they will be allowed to advance the rates 5 per cent. Contracts for a considerable tonnage of plates, shapes and steel bars have been taken by some of the leading mills on the basis of 1.20c., but one large contract for plates for steel car construction was taken by a local mill at 1.15c. Mills selling at current low prices usually insist that buyers furnish shipping specifications with the orders. There is a little more inquirv for pig iron, notably for foundry, and close to $13 at Valley furnace has been quoted for No. 2 for prompt delivery. The leading steel mills are still holding sheet bars at $20 and billets at $21, and some business for first quarter delivery has been done at these prices. Some contracts have been placed for sheets for first quarter on the basis of 1.95c. for No. 28 black and 2.95c. for No. 28 galvanized. In certain competitive territory, No. 28 black sheets have sold at 1.85c. and No. 28 galvanized at 2.85c. Pittsburgh, for January delivery, specifications having been furnished with the orders. The market on coke and scrap is extremely dull, with prices weak and buyers holding off until January.

Pig Iron.—There is more active inquiry, especially for foundry iron than for some time. The Standard Sanitary Mfg. Company is asking prices on 4000 tons of Northern No. 2 foundry for January and February for its New Brighton and Pittsburgh plants and 2000 tons of Southern foundry for its Louisville works. The Union Radiator Company, Johnstown, Pa., has an inquiry out for 4000 tons of foundry for first half. The Pittsburgh Steel Foundry is in the market for 500 tons of basic and the N. & G. Taylor Company is reported as inquiring for 2400 tons of basic for its Cumberland open-hearth steel plant, deliveries being 400 tons a month over first half. The Tod furnace of the Brier Hill Steel Company at Youngstown has blown out and three or four stacks in the Mahoning and Shenango valleys will blow out early in January. There is no new inquiry for Bessemer and the market is weak. In the absence of actual sales we quote Bessemer iron nominally at $15, this would be shaded at least 50c. a ton if any new business was offering; basic, about $12.75; No. 2 foundry, $13; malleable Bessemer, $13.25; gray forge, $13, all at Valley furnace, the freight rate for Cleveland or Pittsburgh delivery being 90c. a ton.

Billets and Sheet Bars.—A good deal of business is pending in sheet bars for delivery in first quarter and first half, but it is slow in being closed and will probably go over to January. Leading Youngstown and Pittsburgh steel mills are holding Bessemer and open-hearth billets firmly at $20 and sheet bars $21, maker's mill. Several smaller steel makers are offering open-hearth billets and open-hearth sheet bars at about 50c. a ton under these prices. We quote Bessemer and open-hearth billets at $20; Bessemer and open-hearth sheet bars, $21, maker's mill, Pittsburgh or Youngstown. Forging billets are $24 to $25 and axle billets about $23, Pittsburgh.

Coke.—While considerable furnace coke is under negotiation for first half delivery contracts are held back as furnaces refuse to pay $2 a ton for first half. Three or four leading makes of furnace coke, regarded as strictly standard, are offered at $1.85 to $1.90. We quote strictly standard furnace coke for first half at $1.85 to $2 per net ton at oven, but no contracts have been made at the higher figure. Best grades of 70-hr foundry coke are $2.50 to $2.60 per net ton at oven.

(*By Mail.*)

Muck Bar.—Several plants in the Pittsburgh and Cleveland districts are closed for lack of orders. No recent sales are reported. We quote best grades of muck bar, made from all pig iron, at $29 Pittsburgh, but this price could be shaded.

Steel Rails.—Some small contracts for rails for 1914 delivery have been given out by railroads, but details have not been made public here. Certain contracts that were expected to be placed this month will go over until January or later. The new demand for light rails is fair, but slightly lower prices are being made by both the mills rolling from billets and by the rerolling rail mills. We quote splice bars at 1.50c. and standard section rails at 1.25c. Light rails, rolled from billets, are quoted as follows: 25, 30, 35, 40 and 45 lb. sections, 1.25c.; 16 and 20 lb., 1.30c.; 12 and 14 lb., 1.35c., and 8 and 10 lb., 1.40c., all in carload lots, f.o.b. Pittsburgh.

Plates.—Few orders of moment for steel cars were placed the past week, but several active inquiries are out. The contract of the Union Pacific for 5000 refrigerator cars is expected to be closed shortly. A number of plate mills in the Central West are closed this week for the holidays and for lack of orders. On very desirable contracts plates have sold at 1.15c. at maker's mill, but the general market is fairly strong at 1.20c. We quote ¼-in. and heavier plates at 1.20c., and for reasonably prompt shipment.

Wire Rods.—The demand is only for small lots. One leading maker has one of its rod mills down for lack of orders. We quote Bessemer, open-hearth and chain rods at $25, Pittsburgh, for desirable orders, and $25.50 for small lots.

Structural Material.—Inquiry is not brisk and the amount of new work being placed is small. The McClintic-Marshall Company has taken a bridge for the Buckhannon & Northern Railroad at Fairmount, W. Va., and a viaduct for the same road, about 1600 tons, and has also taken 250 tons for extensions to buildings for the Sanitary Company of America at Linfield, Pa. We quote beams and channels up to 15 in. at 1.20c. for desirable orders and 1.25c. for small lots.

Ferroalloys.—The announcement that the Carnegie Steel Company had entered the market as a seller of ferromanganese will no doubt be of interest to consumers. A reduction of $2 a ton has been made in the price of 50 per cent. ferrosilicon, effective January 1, and the Carnegie Steel Company is in the market for its requirements for next year, aggregating 8000 tons. We quote English and German 80 per cent. ferromanganese at $47, seaboard, the freight rate for delivery in the Pittsburgh district being $2.16 per ton. The price named by the Carnegie Steel Company for domestic 80 per cent. ferromanganese is understood to be somewhat less than the seaboard price, plus the freight rate to point of delivery. We now quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $73; over 100 tons to 600 tons, $72; over 600 tons, $71, delivered in the Pittsburgh district. We quote 10 per cent. ferrosilicon at $21; 11 per cent., $22, and 12 per cent., $23, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnaces. We quote 20 per cent. spiegeleisen at $25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, and 12½c. in less than 2000-lb. lots.

Skelp.—A fair new demand is reported, and the mills have a good deal of business on their books for delivery over the next two months or more. A local maker has sold several round lots of grooved steel skelp for foreign shipment at close to 1.20c., Pittsburgh. We also note a sale of 2000 tons of grooved steel skelp in narrow sizes to a domestic consumer at 1.20c., maker's mill. We quote grooved steel skelp at 1.20c. to 1.25c.; sheared steel skelp, 1.30c. to 1.35c.; grooved iron skelp, 1.55c. to 1.60c.; and sheared iron skelp at 1.60c. to 1.65c., Pittsburgh.

Iron and Steel Bars.—On several very desirable contracts lately placed, 1.15c., maker's mill, has been done, but the general market is 1.20c., and leading sellers do not favor shading this price, preferring to pass the business up. It is said that several desirable contracts for steel bars have been placed for first quarter delivery on the basis of about 1.20c., Pittsburgh. Specifications against contracts are fair, but all the steel-bar mills are in need of orders. While we quote steel bars on desirable orders at 1.20c. for reasonably prompt shipment, on a very desirable specification this price might be accepted by one or two leading mills for first quarter delivery. We quote common iron bars at 1.35c. to 1.40c., f.o.b. maker's mill, Pittsburgh.

Sheets.—The demand for black, galvanized and roofing sheets so far this month has been in excess of the same period in November. One mill states that its orders entered up to December were larger than in all last month. Jobbers and consumers are still trying to cover on contracts for first quarter, and some business of this kind has been placed, where the buyer furnished the specifications with the order for the January sheets and agreed to furnish promptly specifications for February and March. This business has been placed on the basis of 1.95c. for No. 28 black and 2.95c. for No. 28 galvanized. Youngstown sheet mills have a 5c.

freight rate into Cleveland, and have sold for Cleveland delivery at 1.95c. for No. 28 black and 2.95c. for No. 28 galvanized, which would figure back to 1.85c., Pittsburgh, for No. 28 black and 2.85c. for No. 28 galvanized, the freight rate from this city to Cleveland being 10c. It is only in such cases, however, that regular quotations of 1.90c. for No. 28 black and 2.90c. for No. 28 galvanized for prompt shipment are being shaded. The feeling in the sheet trade is better, and it is believed that prices have about touched bottom. On current orders for prompt shipment we quote No. 28 Bessemer black at 1.90c. and No. 28 galvanized at 2.90c. For delivery in first quarter, where the buyer will furnish specifications for January shipment, we quote No. 28 Bessemer black at 1.95c. and No. 28 galvanized at 2.95c. This week most of the sheet mills in the Central West are down on account of the holiday, and will not resume until Monday, December 29. The above prices are in carload and larger lots, jobbers charging the usual discounts for small lots from store.

Tin Plate.—It is estimated that 90 per cent. or more of the tin plate required for next year is under contract, and early in January the mills will commence to roll plate for delivery against these contracts. There is a fair current demand for prompt shipment, but operations of mills at present are about on a 50 per cent. basis. This week most of the mills are closed, but will resume next week. A small part of the large business booked for 1914 delivery was at the $3.40 price, but most of it was at $3.25 to $3.35, depending on the size of the contract. We quote 100-lb. cokes on current orders for prompt shipment at $3.40 and 100-lb. ternes at $3.30 per base box f.o.b. Pittsburgh, but on large contracts for next year's delivery these prices could be shaded 5c. to 10c. per box.

Shafting.—There is a little more inquiry for prompt delivery, but a heavier demand is looked for in January. Makers report that specifications from large consumers, notably the automobile builders, are not coming in at a satisfactory rate. We quote cold-rolled shafting at 64 to 65 per cent. off in carload and larger lots and 62 to 63 per cent. off in small lots delivered in base territory.

Bolts and Rivets.—Some increase is noted in the inquiry, but orders placed are still only for small lots to meet current wants. The new demand for rivets is better and more business has been placed this month than in any one month for some time. We quote button-head structural rivets at $1.70 and cone-head boiler rivets at $1.80 in carload lots, about $2 a ton advance over these prices being charged for small lots. Terms are 30 days, net, less 2 per cent. for cash in 10 days. Discounts on nuts and bolts, which are being more or less shaded, are as follows in lots of 300 lb. or over, delivered within a 20c. freight radius of makers' works.

Coach and lag screws	80 and 20% off
Small carriage bolts, cut threads	75 and 17½% off
Small carriage bolts, rolled threads	80 and 2½% off
Large carriage bolts	70 and 15% off
Small machine bolts, cut threads	80 and 2½% off
Small machine bolts, rolled threads	80 and 7½% off
Large machine bolts	75 and 10 and 2½% off
Machine bolts, with C.P.C. and T nuts, small,	70 and 12½% off
Machine bolts, with C.P.C. and T nuts, large,	70 and 12½% off
Square hot pressed nuts, blanked and tapped	$6.00 off list
Hexagon nuts	$6.70 off list
C.P.C. and R square nuts, tapped and blanked	$5.80 off list
Hexagon nuts, ¾ and larger	$6.80 off list
Hexagon nuts, smaller than 9/16	$7.40 off list
C.P. plain square nuts	$5.30 off list
C.P. plain hexagon nuts	$5.70 off list
Semi-finished hexagon nuts, ¾ and larger	85 and 10% off
Semi-finished hex. nuts, smaller than 9/16	85, 10 and 5% off
Rivets, 7/16 x 6½, smaller and shorter	80 and 10% off
Rivets, metallic tinned, bulk	80 and 10% off
Rivets, tin plated, bulk	80 and 10% off
Rivets, metallic tinned, packages	80 and 10% off
Standard cap screws	75, 10, 10 and 7½% off
Standard set screws	75, 10, 10 and 7½% off

Hoops and Bands.—While new business is fair, it is mostly small lots for prompt shipment. Contracts for bands for first quarter delivery are being accepted at 1.20c. and for hoops at 1.35c. to 1.40c., but makers insist that specifications must accompany these contracts. We quote steel bands at 1.20c., with extras as per the steel bar card, and steel hoops at 1.35c. to 1.40c., maker's mill.

Wire Products.—The buying season in wire products is about over and new orders are only for small lots to meet current needs. Some makers state they are accepting contracts for not more than 30 days ahead at present prices. The market is not strong and there are reports that for delivery in certain competitive territory wire nails are being offered at $1.50 and plain wire at $1.40. We quote wire nails to jobbers at $1.55; cut nails, $1.55; plain annealed wire, $1.35; galvanized barb wire and fence staples, $1.95, and painted barb wire, $1.55, f.o.b. Pittsburgh, per 100 lb., usual terms, actual freight added to point of delivery. We quote woven wire fencing at 74½ per cent. off in carload lots; 73½ per cent. off on 1000-rod lots, and 72½ per cent. on less than 1000-rod lots, all f.o.b. Pittsburgh.

Railroad Spikes.—More inquiries for large lots of railroad spikes for next year have been sent out by leading railroads, and it is estimated that 60,000 kegs or more are now under negotiation. One leading Western road placed 5000 kegs in the past week. The market is now more active than it has been for some months. Definite inquiries from the New York Central and the Erie railroads for large quantities of spikes are expected in the near future. We quote railroad spikes in base sizes, 5½ x 9/16 in. at $1.50, but on desirable contracts it is likely this price is slightly shaded. We quote small railroad and boat spikes at $1.55 per 100 lb., f.o.b. Pittsburgh.

Merchant Steel.—Contracts booked by the mills some time ago are pretty well cleaned up and very little active business is on the books for forward delivery. The new demand is only for small lots to cover current needs. Prices are not strong, but on desirable orders continue to be shaded. Nominal prices for small lots are as follows: Iron finished tire, 1½ x ½ in., and larger, 1.35c., base; under 1½ x ½ in., 1.50c.; planished tire, 1.55c.; channel tire, ¾ to ⅞ and 1 in., 1.85c. to 1.95c.; 1⅛ in. and larger, 1.95c.; toe calk, 1.95c. to 2.05c., base; flat sleigh shoe, 1.70c.; concave and convex, 1.75c.; cutter shoe, tapered or bent, 2.25c. to 2.35c.; spring steel, 1.95c. to 2.05c.; machinery steel, smooth finish, 1.80c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and 1½ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.25c.; soft, 3.50c.; coils, hard, 3.15c.; soft, 3.40c.; freight allowed. The usual differentials apply for lighter sizes.

Standard Pipe.—Business in lap and butt weld iron and steel pipe continues fairly heavy, one leading mill stating that its orders booked up to December 20 were as large as in the same period in November. No large inquiries are out for gas or oil lines, and as it is so late in the season it is probable that work of this kind contemplated will go over until spring. The leading pipe mills are pretty well fixed with orders for two months and are operating at 75 to 80 per cent. of capacity. It is claimed that discounts on both iron and steel pipe are being firmly held.

Boiler Tubes.—The new demand is fair, but only for small lots to cover current needs. A larger buying movement is looked for in January. Discounts continue to be more or less shaded, depending on the order.

Old Material.—The scrap market is almost lifeless. Consumers having contracts with dealers are asking them to hold up shipments as much as possible until after January 1. The Pittsburgh Crucible Steel Company recently asked for suspension of scrap shipments to Midland, Pa., for two weeks, and the embargo is still in force on scrap routed for the Cambria Steel Company at Johnstown, Pa. While heavy melting scrap has been sold in odd lots as low as $10.50 delivered at buyer's mill, it is not believed that any large quantities conld be obtained at this price. A betterment in demand is looked for in January. We note a sale of 200 tons of low-phosphorus melting scrap at $14.25 delivered at buyer's mill. Slight reductions have been made in quotations on selected heavy steel scrap, rerolling rails and busheling scrap. Dealers are quoting about as follows per gross ton for delivery in the Pittsburgh and other districts:

Selected heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery		$10.75
Compressed side and end sheet scrap	$9.75 to	10.00
No. 1 foundry cast	12.00 to	12.25
No. 2 foundry cast	10.75 to	11.00
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	6.50 to	6.75
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	13.00 to	13.25
No. 1 railroad malleable stock	11.25 to	11.50
Grate bars	7.50 to	7.75
Low phosphorus melting stock	14.00 to	14.25
Iron car axles	24.25 to	24.75
Steel car axles	17.25 to	17.50
Locomotive axles, steel	20.75 to	21.25
Locomotive axles, iron	25.25 to	25.75
No. 1 busheling scrap	10.25 to	10.50
No. 2 busheling scrap	6.25 to	6.75
*Machine shop turnings	6.50 to	6.75
Old carwheels	13.00 to	13.25
*Cast-iron borings	7.25 to	7.50
†Sheet bar crop ends	13.50 to	13.75
Old iron rails	14.25 to	14.50
No. 1 railroad wrought scrap	13.50 to	13.75
Heavy steel axle turnings	8.75 to	9.00
Stove plate	7.50 to	7.75

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.
†Shipping point.

Chicago

CHICAGO, ILL., December 24, 1913.—(*By Telegraph.*)

A noticeably larger inquiry from which encouragement is taken, a falling off in actual orders attributable to the holiday week approaching, and the very general intention of mills to shut down for a considerable part of the remainder of the year, cover for the most part the developments of the past week. The new year and the new quarterly period are now so close at hand that all signs that might show the trend of the market are under close observation. Among indications to which importance is attached are the negotiations for the placing of first quarter and first half tonnage under contract. Contracts for the first quarter are being taken by the mills at current prices, but buying for the six months is limited to arrangements which cannot be avoided. The increased number of buyers who are now content with going prices as a basis for the first half is a source of encouragement. Railroad inquiry is heavier and sales of track supplies are of some moment. Prices for shapes, plates and bars are unchanged. Pig iron sales have been comparatively few and of no important significance. Present prices of scrap are thought to make possible only one change and that for the better.

Pig Iron.—Recent transactions in pig iron have created a materially increased interest in the market on the part of many foundries, and there is little doubt that a number of substantial tonnages are being booked quietly. The inquiry that has appeared already and the promise of business to be closed early in January have undoubtedly fortified the furnace position against further declines in the price of Northern irons, and it seems unlikely that the quotations made on recent large tonnages will be duplicated. On the contrary, Southern iron in this market is not so strong, and for delivery to the districts surrounding Chicago $10.50, Birmingham, is the accepted price with little resistance offered at that level. At South Chicago the Iroquois Furnace Company has blown in a third stack, but will shortly blow out one of its new furnaces, leaving but two in operation. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 1, 2, 3, 4	$15.25 to $15.75
Northern coke foundry, No. 1	15.00 to 15.50
Northern coke foundry, No. 2	14.00 to 15.00
Northern coke foundry, No. 3	13.50 to 14.00
Southern coke, No. 1 foundry and No. 1 soft	15.35 to 15.85
Southern coke, No. 2 foundry and No. 2 soft	14.85 to 15.35
Southern coke, No. 3	14.35 to 14.85
Southern coke, No. 4	13.85 to 14.35
Southern gray forge	13.85 to 14.35
Southern mottled	13.35 to 13.85
Malleable Bessemer	14.50 to 15.00
Standard Bessemer	17.65
Basic	13.50 to 14.00
Jackson Co. and Kentucky silvery, 6 per cent	18.40
Jackson Co. and Kentucky silvery, 8 per cent	19.40
Jackson Co. and Kentucky silvery, 10 per cent	20.40

Wire Products.—The period of stock taking common to most dealers and jobbers is limiting activity in wire products, but it is reported that consumers are now disposed to contract on the present basis. This disposition is probably responsible in part for the comparative firmness of the market at 1.55c., Pittsburgh, for wire nails. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, $1.53 to $1.58; wire nails, $1.73 to $1.78; painted barb wire, $1.73 to $1.78; galvanized, $2.10 to $2.15; polished staples, $1.73 to $1.78; galvanized, $2.05 to $2.10, all Chicago.

Cast-Iron Pipe.—There were no lettings of importance last week. The award of 1500 tons of pipe at Cincinnati has been postponed. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $27; 6 to 12 in., $25; 16 in. and up, $24, with $1 extra for gas pipe.

(*By Mail*)

Rails and Track Supplies.—In line with an increased inquiry on the part of the railroads in various sections of the country, tentative arrangements have been made in this territory covering the rail requirements of some of the western roads preliminary to more definite contracting within the next few days. Business in spikes for the week included one of the large orders of the year. In general the amount of business to be placed at Chicago is beginning to be the foundation for a mild optimism. We quote standard railroad spikes at 1.60c. to 1.70c., base; track bolts with square nuts, 2.05c. to 2.10c., base, all in carload lots, Chicago; tie plates, $27 to $28 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—Important contracts for fabrication for work in Chicago have been so few that the award of 2300 tons for the new Crane Company plant last week is of special interest. The steel will be furnished jointly by the South Halsted Street Iron Works and the Vierling Steel Company, about 1300 tons being Bethlehem shapes. Kenwood Bridge Company has 469 tons for Minneapolis Athletic Club. The addition to Kaiserhof Hotel, which is close to placing, calls for 3500 to 4000 tons. At St. Paul the letting of the Merchants' National Bank has been postponed. Prices for plain material have not changed to an appreciable extent. If the willingness on the part of users to buy material ahead may be taken as an indication, there is if anything a more general acceptance of 1.20c. Pittsburgh as a low price. For Chicago delivery from mill we continue to quote 1.38c.

For structural material out of stock we quote 1.75c.

Plates.—The activity of Lake shipyards in building new boats since the recent storm has been a factor in recent bookings by the local mills. The new plate capacity is largely engaged with the rolling of car plates, and, with allowance for the holiday shut-downs, has rolling schedules through the remainder of the year. Such weakness as exists in plates on the basis of 1.38c. Chicago is more generally brought out by concessions intended to influence structural tonnage For Chicago delivery we quote 1.38c. from mill.

For Chicago delivery out of stock we quote 1.75c.

Sheets.—The usual neglect of business incident to the holiday season is beginning to be apparent in specifications; perhaps more noticeably with respect to sheets for the reason that tonnage in this line has been fairly well maintained. Some contracting for first quarter shipments has been done and the readiness of users to commit themselves on the present price level is a hopeful indication. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.68c. to 1.73c.; No. 28 black, 2.08c. to 2.13c.; No. 28 galvanized, 3.08c. to 3.13c.

For sheets out of store our quotations for Chicago delivery are as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 1.95c.; No. 28 black, 2.45c. to 2.55c.; No. 28 galvanized, 3.50c. to 3.60c.

Bars.—It is worthy of comment that the general market level for steel bars has been maintained at 1.33c., Chicago, despite the precedent of lower prices made in a few instances. The temporary idleness of so many mills during the last week of the month can hardly do otherwise than enhance this appearance of strength even though orders are very scarce. On bar iron the price of 1.10c. can be secured by the close buyer but the average market stands at a somewhat higher figure. We quote for mill shipment as follows: Bar iron, 1.10c. to 1.15c.; soft steel bars, 1.28c. to 1.33c.; hard steel bars, 1.35c. to 1.40c.; shafting in carloads, 65 per cent. off; less than carloads, 60 per cent. off.

Store prices for bars and shafting have been revised and we quote for Chicago delivery: Soft steel bars, 1.65c.; bar iron, 1.65c.; reinforcing bars, 1.65c. base, with 5c. extra for twisting in sizes ½ in. and over, and usual card extras for smaller sizes; shafting 57 per cent. off.

Rivets and Bolts.—Makers of rivets and bolts are forced to content themselves with a minimum of new business available under stress of severe competition, particularly in this market. Under conditions like the present quotations cannot be otherwise than nominal. We quote from mill as follows: Carriage bolts up to ⅜ x 6 in., rolled thread, 80-7½; cut thread, 80; larger sizes, 75; machine bolts up to ⅜ x 4 in., rolled thread, 80-12½; cut thread, 80-7½; large size, 75-7½; coach screws, 80-15-10; hot pressed nuts, square head, $6 off per cwt.; hexagon, $6.70 off per cwt. Structural rivets, ½ to 1¼ in., 1.88c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Out of store we quote for structural rivets, 2.40c., and for boiler rivets, 2.60c. Machine bolts up to ⅜ x 4 in., 70-10-10; larger sizes, 70-12½; carriage bolts up to ⅜ x 6 in., 75-10; larger sizes, 70-12½ off. Hot pressed nuts, square head, $5.50, and hexagon, $6.20 off per cwt.

Old Material.—In anticipation of better things, the wish is frequently father to the thought and hopes are unfulfilled. This is especially true in connection with the trade in old material. Nevertheless, the past week has witnessed for the first time in several months a disposition to "go long" on scrap among the local brokers. This means an expectation of some recovery of the market, as well as the belief that minimum

prices now prevail. Interest also attaches to the fact that the one melter of shoveling steel in this market will make more stringent specifications in the future and thus reduce very much the amount of acceptable material. Railroad offerings of scrap are again large, including 2000 tons from the Chicago, Burlington & Quincy, 2900 tons from the Chicago, Milwaukee & St. Paul, 1700 tons from the Northern Pacific and 800 tons from the Chicago & Alton, in addition to a general list from the Santa Fe. The St. Paul list embraces a lot of 1000 tons of steel rails and 500 tons of iron rails. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.

Old iron rails	$13.00 to $13.50
Old steel rails, rerolling	11.25 to 11.75
Old steel rails, less than 3 ft.	10.25 to 10.75
Relaying rails, standard section, subject to inspection	24.00
Old carwheels	11.50 to 12.00
Heavy melting steel scrap	9.00 to 9.50
Frogs, switches and guards, cut apart	9.00 to 9.50
Shoveling steel	8.00 to 8.50
Steel axle turnings	6.50 to 7.00

Per Net Ton.

Iron angles and splice bars	$11.75 to $12.25
Iron arch bars and transoms	11.75 to 12.25
Steel angle bars	8.00 to 8.50
Iron car axles	17.00 to 17.50
Steel car axles	12.00 to 12.50
No. 1 railroad wrought	8.50 to 8.75
No. 2 railroad wrought	7.75 to 8.00
Cut forge	7.75 to 8.00
Steel knuckles and couplers	8.75 to 9.25
Steel springs	9.25 to 9.75
Locomotive tires, smooth	10.25 to 10.75
Machine shop turnings	4.00 to 4.25
Cast borings	3.75 to 4.00
No. 1 busheling	7.25 to 7.50
No. 2 busheling	5.75 to 6.00
No. 1 boilers, cut to sheets and rings	5.75 to 6.00
Boiler punchings	9.50 to 10.00
No. 1 cast scrap	10.00 to 10.25
Stove plate and light cast scrap	9.25 to 9.75
Grate bars	8.25 to 8.75
Railroad malleable	9.00 to 9.25
Agricultural malleable	8.00 to 8.50
Pipes and flues	6.50 to 7.00

The Central Iron & Metal Company, 3650 South Rockwell street, Chicago, dealer in scrap iron, has increased its capital stock from $15,000 to $100,000.

Philadelphia

PHILADELPHIA, PA., December 24, 1913—(*By Telegraph*).

Heavy sales of foundry and steel-making pig iron have been the feature of the market. Large purchases of basic for extended delivery have been made and new low prices established. General inquiry for foundry grades has also improved, and a better sentiment, notwithstanding price weakness, is apparent. Consumers in nearly all classes of finished products show more interest in the situation, although orders, with few exceptions, continue light. Producers of rolled products are less disposed to make concessions, while consumers hold off pending developments. Negotiations for round lots of billets are pending, but there appears to be a deadlock on prices. A number of mills have shut down for the holidays and will not resume until January 5, while in instances more extended idleness is promised. Heavy first half coke sales have been made at $2 at oven. The old material market is sentimentally stronger, based on increased inquiry.

That prices of plates and shapes are governed more particularly by the anxiety of mills for work is evidenced by the quotation of 1.21c., Eastern mill, on desirable business for early shipment, which came out today. A sale of 2000 tons of rolling billets for first quarter has been made by an Eastern mill, and $22.40 for rolling billets can be shaded on desirable business. Small sales of trial lots of foreign low-phosphorus pig iron have been made for early shipment at $20.50 to $21, delivered.

(*By Mail*)

Iron Ore.—Consumers show no interest in the market. Importations during the week ended December 20 include 5920 tons from Newfoundland, 25,499 tons from Sweden, 10,500 tons from Cuba, 5581 tons from Spain and 3000 tons from Venezuela.

Pig Iron.—Extremely quiet negotiations covering several large blocks of basic iron have come to light, although definite details are still lacking. The leading Eastern basic consumer purchasing in the open market has closed for a round lot of basic, for delivery covering, it is stated, both first quarter and more extended shipment, dividing the order among a number of Eastern merchant furnaces. The actual quantity is withheld, but is estimated to have been in the neighborhood of 25,000 tons. Prices are reported to have been between $14.25 and $14.50 delivered, representing a decline of 50c. to 75c. from the last recorded transaction. Another basic deal, involving upward of 12,000 tons, at approximately the same price, for central Pennsylvania delivery, during the first quarter of next year, is reported. Outside of these basic sales, the most important transaction was that covering the Pennsylvania Railroad inquiry for foundry iron for first quarter delivery at Altoona, which aggregated about 6500 tons. Of this 5000 tons was distributed among central Pennsylvania furnaces. In addition to these heavy sales there has been a fair proportion of moderate business, so that the trade has had one of the most active weeks for a long period. Inquiries for moderate tonnages for early 1914 delivery have come out more freely. Prices continue easy. While a number of the leading producers are holding at $15.25, delivered, for standard brands of No. 2 X eastern Pennsylvania foundry, others have been quoting $15 for good merchantable brands. Buffalo irons are offered freely for early shipment, at $15.20 here, while it is rumored that some central Pennsylvania brands can be had under that figure. There has been a fair movement in Virginia foundry iron at $12.75 to $13 at furnace for No. 2 X. A sale of 1000 tons of Virginia low grade to a Virginia pipe founder, who is also credited with heavy purchases of Southern low grade, is announced. Cast-iron pipe makers in this district have purchased some odd lots of low-grade foundry at $14.25 to $14.50 delivered. The Standard Cast Iron Pipe & Foundry Company has again asked for revised bids on 5000 tons, unclosed against an old inquiry. Rolling mill grades have not been active. A sale of 500 tons of forge at $14.75 was made, although slightly lower prices have been named. Several large as well as small lots of low phosphorus pig iron are under negotiation, but no important sales have been made. While furnaces make no effort to force business, small concessions have been made on competitive business and the following range of quotations about represents the market for prompt and near future deliveries in buyers' yards in this vicinity:

Eastern Pennsylvania No. 2 X foundry	$15.00 to $15.25
Eastern Pennsylvania No. 2 plain	14.75 to 15.00
Virginia No. 2 X foundry	15.55 to 16.00
Virginia No. 2 plain	15.55 to 15.75
Gray forge	14.50 to 14.75
Basic	14.25 to 14.50
Standard low phosphorus	21.50

Ferroalloys.—Eighty per cent. ferromanganese has been in comparatively light demand in this district, although an inquiry for 2000 tons for Western delivery is noted. Current business has been confined to small sales for early delivery at $47, seaboard, which represents the market for both English and German brands. Importations during the week aggregated 498 tons. The demand for ferrosilicon has been extremely quiet.

Billets.—The leading producer in this district, the Alan Wood Iron & Steel Company, Ivy Rock, Pa., closed its plant indefinitely on Saturday night. It is hoped that operations may be resumed January 5, but all depends on the volume of business taken by that date. Considerable tonnage is before the trade for early 1914 delivery, but negotiations appear deadlocked as to prices. Consumers endeavor to obtain further concessions, but mills are not desirous of placing long delivery orders, even at current quotations. Producers are carrying extensive stocks and are well able to take care of ordinary business and to deliver promptly. Basic open-hearth rolling billets are quoted at $22.40 delivered in this district, with ordinary forging billets at about $26.40.

Plates.—Business shows some variation in volume. One Eastern mill continues to book orders at a 90 per cent. capacity rate and to operate its mill at about 75 per cent. Consumers are more inclined to place contracts and would cover for the first half if makers would accept the business. Quite a number of first quarter contracts, covering moderate quantities, have been entered at 1.40c. delivered here. In instances, mills plan to be idle from Wednesday until Monday and do not expect to close for the New Year holiday. New business continues of a miscellaneous character, with prices ranging from 1.35c. to 1.45c. for ordinary plates, delivered in this vicinity.

Structural Material.—Reports are current that a contract has been taken by an Eastern mill covering some 12,000 tons of plain shapes, presumably for car work, but the report lacks confirmation. The bulk of the orders recently has been for small miscellaneous lots and mills report little improvement in the general situation. Fabricated material has been in light de-

mand, with orders covering small quantities only. New inquiry is light. A Southern railroad is said to be revising specifications for bridge work calling for several thousand tons of material. Prices are practically unchanged at 1.35c. to 1.40c. for plain shapes, delivered in this district.

Sheets.—A fair demand for small prompt lots is noted More interest is also being shown in contract sheets, but consumers usually ask for price concessions which mills refuse to grant. The bulk of the business taken by mills in this district is shipped from stock, as most of them have suspended operations until after the holidays. For current business in No. 10 blue annealed sheets prices are unchanged at 1.60c. to 1.65c. delivered here.

Bars.—Business continues quiet. Steel bars are in light demand, with quotations unchanged at 1.35c. to 1.40c. delivered here. In ordinary iron bars business moves slowly, and prices while weak are practically unchanged, ranging from 1.22½c. to 1.27½c. delivered in this district, with the better grades about 10c. per 100 lb. higher.

Coke.—Transactions involving some 48,000 tons of named brand furnace coke for first half delivery have been closed at $2 at oven. Unnamed brands are available at $1.90 to $1.95. Small sales of prompt furnace coke have been made at $1.75. There has been little movement in foundry coke, the price of which remains unchanged. The following range of prices is named, per net ton, delivered in buyers' yards in this district:

Connellsville furnace coke	$3.90 to $4.40
Connellsville foundry coke	4.90 to 5.25
Mountain furnace coke	3.60 to 4.10
Mountain foundry coke	4.60 to 4.95

Old Material.—While the volume of business moving has been small, merchants are greatly encouraged by the increased inquiry, particularly in rolling-mill grades. Consumers are asking for quotations on borings, turnings, wrought pipe, carwheels and cast iron for early 1914 shipment, and indicate a willingness to make purchases after the year end. Wrought pipe has been bought freely by one interest at $9 delivered. Heavy melting steel is quiet but sentimentally stronger. While quotations are largely nominal, the following range about represents figures at which business could be done, delivered in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates varying from 35c. to $1.35 per gross ton:

No. 1 heavy melting steel	$10.00 to $10.25
Old steel rails, rerolling (nominal)	12.25 to 12.50
Low phosphorus heavy melting steel scrap (nominal)	14.00 to 14.50
Old steel axles (nominal)	15.50 to 16.00
Old iron axles (nominal)	21.00
Old iron rails (nominal)	15.50
Old carwheels	12.00 to 12.50
No. 1 railroad wrought	12.75 to 13.00
Wrought-iron pipe	9.00 to 9.25
No. 1 forge fire	7.75 to 8.25
No. 2 light iron (nominal)	5.00
No. 2 busheling (nominal)	7.50 to 8.00
Wrought turnings	6.75 to 7.00
Cast borings	7.50 to 7.75
Machinery cast	12.00 to 12.50
Grate bars, railroad	9.00 to 9.50
Stove plate	9.50 to 10.00
Railroad malleable (nominal)	9.50 to 10.00

Cincinnati

CINCINNATI, OHIO, December 23, 1913—(*By Telegraph*).

Pig Iron.—The present stagnant condition of the iron market is principally due to the usual slowing down of operations at this time of the year. Practically no inquiry is before the trade, with the exception of several unclosed orders, some of which have been worked on for over 30 days. Buying is confined to a few urgent small lots for immediate shipment. Melters are not disposed to consider seriously propositions for their future requirements, preferring to wait until after the holidays. The limited demand for prompt shipment foundry coke indicates that the melt of iron has fallen off considerably in this territory. Prices are somewhat uncertain and $10.50, Birmingham, can be done on first quarter business. Ironton producers are quoting $13 for shipment extending through the first half. As far as can be ascertained, this price has not been shaded, although Lake furnace competition at a number of points would make this figure prohibitive. Michigan melters have lately bought some small tonnages of silvery irons, and it is also stated that the attractive ngures named by Lake furnace operators have resulted in the buying in that territory of a limited quantity of foundry iron for future shipment. Neither malleable nor basic is in demand, and both are quoted at the same price as No. 2 foundry. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 foundry and 1 soft	$14.25 to $14.75
Southern coke, No. 2 foundry and 2 soft	13.75 to 14.25
Southern coke, No. 3 foundry	13.25 to 13.75
Southern, No. 4 foundry	12.75 to 13.25
Southern gray forge	12.25 to 12.75
Ohio silvery, 8 per cent. silicon	17.70 to 18.20
Southern Ohio coke, No. 1	15.20 to 15.70
Southern Ohio coke, No. 2	14.20 to 14.70
Southern Ohio coke, No. 3	13.95 to 14.20
Southern Ohio malleable Bessemer	14.20 to 14.70
Basic, Northern	14.20 to 14.70
Lake Superior charcoal	16.25 to 17.25
Standard Southern carwheel	27.25 to 27.75

(*By Mail*)

Coke.—The demand is very light for both furnace and foundry coke, especially for the latter. Prices, however, are a trifle firmer for Connellsville, and there are said to be only odd lots of 48-hr. to be obtained at $1.75 for prompt shipment. Contract prices range from $1.85 to $2 per net ton at oven. Both Wise County and Pocahontas producers ask about 20c. a ton above these figures. Connellsville foundry coke is quoted at $2.50 to $2.80 for either prompt or future shipment, with Wise County and Pocahontas brands 25c. a ton higher.

Finished Material.—The holiday season has caused a let-up, and the next two weeks will doubtless be a very dull period for both mills and warehouses. Sheets are probably in better demand than any other class of material, although there is not much contracting for shipment ahead. No. 28 black sheets are still quoted at 2.05c. to 2.10c. and galvanized at 3.05c. to 3.10c., f.o.b. cars Cincinnati. The local warehouse price on steel bars is around 1.75c. and on structural material 1.85c. to 1.90c. The railroads in this vicinity are buying sparingly all kinds of track material.

Old Material.—Practically no demand is felt for scrap of any kind, with the exception of a few small deals made with foundries in this territory. There are no staple quotations, prices being adjusted on each particular transaction. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton.	
Bundled sheet scrap	$6.00 to $6.50
Old iron rails	10.50 to 11.50
Relaying rails, 50 lb. and up	19.25 to 19.75
Rerolling steel rails	10.50 to 11.00
Melting steel rails	8.75 to 9.25
Old carwheels	9.75 to 10.25
Per Net Ton.	
No. 1 railroad wrought	$8.00 to $8.50
Cast borings	4.00 to 4.50
Steel turnings	4.00 to 4.50
No. 1 cast scrap	8.25 to 8.75
Burnt scrap	5.50 to 6.00
Old iron axles	15.50 to 16.00
Locomotive tires (smooth inside)	9.25 to 9.75
Pipes and flues	5.25 to 5.75
Malleable and steel scrap	6.25 to 6.75
Railroad tank and sheet scrap	4.00 to 4.50

Cleveland

CLEVELAND, OHIO, December 23, 1913.

Iron Ore.—The year 1913 will close with an unfavorable outlook for the ore trade for the coming year, both as to volume of business and prices. Ore firms are as yet giving the subject of prices no consideration, as a buying movement is not expected before spring. Little ore is being sent from the docks to furnace yards. We quote 1913 prices as follows: Old range Bessemer, $4.40; Mesaba Bessemer, $4.15; old range non-Bessemer, $3.50; Mesaba non-Bessemer, $3.40.

Pig Iron.—Some foundry iron is being sold in small lots for delivery through the first half, but little inquiry for round tonnages is coming out. The Standard Sanitary Mfg. Company is in the market for 3000 to 4000 tons of Northern foundry iron for January and February delivery, in addition to 2000 tons of Southern, the inquiry for the latter being noted last week. Lower quotations are being made by some of the Valley furnaces than have prevailed recently. Small lots are being sold at $13.25. Valley furnace, for No. 2 for delivery through the first half and round lots can be had at $13. One quotation as low as $12.75 is reported. Cleveland furnaces are quoting No. 2 foundry at $13 to $13.50 for outside shipment; while several small lots have been sold at the higher price, it is probable that $13 can be shaded in some cases. In Detroit No. 2 foundry is selling at $14 to $14.25, delivered, and in Toledo the quotation is $13.25 to $13.50, at furnace. Southern iron is now quoted at $10.75, Birmingham, by Tennessee furnaces, but Alabama furnaces appear to be

adhering to $11 for shipment to this territory. A local consumer has tested the market on a 1000-ton inquiry, but so far has been unable to secure a $10.50 price. Owing to the decrease in melt, many consumers will have enough last half iron to last them a month or two in the new year. We quote, delivered Cleveland, as follows:

Bessemer	$15.90
Basic	13.50
Northern No. 2 foundry	$13.50 to 13.75
Southern No. 2 foundry	15.10 to 15.35
Jackson County silvery, 8 per cent. silicon	18.55

Coke.—The market is quiet and prices are weak. There is a surplus of foundry coke because of the holding up of shipments on contract by some consumers. We quote standard makes of Connellsville foundry coke at $2.50 to $2.75 per net ton. Standard furnace coke is quoted at $1.70 to $1.75 for prompt shipment and $1.80 to $2 for contract.

Finished Iron and Steel.—Specifications are somewhat better and the sentiment has slightly improved. Some inquiry continues to come out for first half, but sellers do not appear eager to take on contracts, and particularly for delivery after the second quarter. If mills were willing to make contracts at current prices they could take on a good-sized tonnage. Prices on steel bars are well maintained at 1.20c., Pittsburgh, and buyers can secure this price for first quarter delivery. One consumer has tried to buy a round tonnage for prompt shipment at 1.10c., but has been unable to get that quotation. Plates are generally selling at 1.20c. for early delivery, but a few sales are reported at 1.15c. Structural material is easier and it can be bought in round lots for early delivery at 1.20c., and at 1.25c. for first quarter. Local quotations on iron bars have been reduced $1 a ton to 1.20c., and this price might be shaded; the demand is light, and both local mills, which shut down December 20, will probably not start up for three weeks. Sheets are generally quoted at 1.85c. for No. 28 black and 2.85c. for No. 28 galvanized, at maker's mill. Blue annealed sheets are weaker, being quoted down to 1.35c. Warehouse prices have been reduced $2 a ton to 1.80c. for steel bars and 1.90c. for plates and structural material.

Old Material.—The market is very dull and no improvement can be looked for until January. A number of the Cleveland mills shut down December 20 for two weeks and some will probably stay down a longer period. Mills have refused to consider offers of scrap at low prices for future delivery, attractive prices not appealing to them in view of the fact that they have so little tonnage on their books. Some local shipments are being held up. Busheling is weaker, mills not offering over $8 for No. 1. Other prices are unchanged. We quote f.o.b. Cleveland as follows:

Per Gross Ton.

Old steel rails, rerolling	$12.00 to $12.50
Old iron rails	12.50 to 13.00
Steel car axles	16.50 to 17.00
Heavy melting steel	9.25 to 9.50
Old carwheels	11.50 to 12.00
Relaying rails, 50 lb. and over	23.00 to 25.00
Agricultural malleable	9.00 to 9.50
Railroad malleable	10.00 to 10.50
Light bundled sheet scrap	6.50 to 7.00
Bundled tin scrap	11.00 to 11.50

Per Net Ton.

Iron car axles	$18.00 to $19.00
Cast borings	5.50 to 5.75
Iron and steel turnings and drillings	4.25 to 4.50
Steel axle turnings	5.75 to 6.00
No. 1 busheling	7.75 to 8.00
No. 1 railroad wrought	9.50 to 10.00
No. 1 cast	10.50 to 11.00
Stove plate	8.00 to 8.50

Birmingham

BIRMINGHAM, ALA., December 22, 1913.

Pig Iron.—The same interest which up to December 13 had sold 6400 tons of pig iron for first and second quarter delivery in Southern territory at claimed bases of $11 and $11.50 for first and second quarters, respectively, has sold altogether 10,000 tons since December 12. It is stated that none of this iron went below $11. The metal manufactured by this company is a favorite with a number of consumers. Another company having several active furnaces disposed of its make during the month. The leading interest is reported as having maintained the $11 basis in the foundry orders taken by it recently. It is heard that Southern pig iron can be had for $10.50, but it is believed that some Tennessee iron, which enjoys a freight rate differential in its favor of 50c. to $1 per ton, has been sold on that basis. No one in a position to know claims that anything lower than possibly $10.75 for spot has been done in the Birmingham district, and it is difficult to discover any claimed to have been sold below $11. No one admits doing it and no operator mentions any other as suspected of having shaded the market. A well-posted authority says: "The inquiry is much better. I feel confident that after the holidays there will be a large buying movement and I believe that Birmingham district makers will be able to maintain the $11 level for early 1914 business. Our home consumption will greatly increase in the early part of the year; the demand for basic iron at home will increase, and new and large pipe plants must be provided with foundry iron. If these new plants go into operation, and there is no reason to believe they will not, home consumption will take care of the iron to the extent that it will not be offered at a sacrifice in competitive territory." This appears to be about the situation. Operations at the steel works continue at the pace maintained for the past several weeks, with no indication of further curtailment. We quote, per gross ton, f.o.b. Birmingham district furnaces (the higher price obtained for special iron) as follows:

No. 1 foundry and soft	$11.25 to $11.75
No. 2 foundry and soft	11.00 to 11.25
No. 3 foundry	10.75 to 11.00
No. 4 foundry	10.50 to 10.75
Gray forge	10.25 to 10.50
Basic	11.00 to 11.25
Charcoal	23.50 to 24.00

Cast-Iron Pipe.—Operations of foundries are restricted, but there has not been any complete shutdown. Sufficient small orders are received to keep the plants going at reduced rate. Prices are reported as fairly well maintained and the feeling that conditions will soon be better is general. We quote, f.o.b. manufacturers' yards, as follows, per net ton: 4-in., $22; 6-in. and upward, $20.

Coal and Coke.—The demand for coke is not brisk, but the output finds sale at prices prevailing for some weeks. The Sloss-Sheffield Steel & Iron Company will on January 1 shut down the city ovens built in 1881, as per agreement with the city of Birmingham, and will build a coke plant at Bessie or some other mine, the bee-hive type to be maintained, it is understood. We quote, per net ton, f.o.b. oven, as follows: Furnace coke, $2.75 to $3; foundry, $3.25 to $4. Small domestic mines are working on part time and the mild winter continues to restrict operations. The State mine inspector announces that from returns at hand the Alabama output for 1913 will approximate 17,500,000 tons, making a new high record. Railroads are still using coal placed in yards some time ago. Prices, however, have not sagged.

Old Material.—Scrap dealers report a small business, but are not afraid to lay in stocks in the belief that there will be an increased demand after the holidays, incident to new steel industries and foundries. Quotations, per gross ton, f.o.b. dealers' yards, are continued, as follows:

Old iron axles (light)	$15.00 to $15.50
Old steel axles (light)	15.00 to 15.50
O'd iron rails	12.50 to 13.50
No. 1 railroad wrought	12.00 to 12.50
No. 2 railroad wrought	10.00 to 10.50
No. 1 country wrought	9.50 to 10.00
No. 2 country wrought	8.50 to 9.00
No. 1 machinery cast	10.00 to 10.50
No. 1 steel scrap	10.50 to 11.00
Tram carwheels	10.50 to 11.00
Standard carwheels	12.00 to 12.50
Light cast and stove plate	8.50 to 9.00

German Bars Up and Pig Iron Down

BERLIN, December 11, 1913.

A further slight improvement in bars is reported. On the other hand, the Pig-Iron Syndicate has begun to make price concessions. The supposition expressed in this correspondence last week that it would have to reduce prices on the upper Rhine in order to meet English competition has been justified by the event.

Reduction in Pig-Iron Prices to Home Buyers

The Syndicate is offering hematite at 82.30 marks ($19.59), and No. 3 foundry at 74.30 marks ($17.68), delivered at Mannheim. These figures denote a reduction of 1 mark (24c.) a ton upon the prices recently adopted for the first half of 1914. The Syndicate has also decided to make a concession to large consumers to induce them to place orders at once for their 1914 requirements. It is offering to take orders for 1000 to 10,000 ton lots at cuts of 50 pfennigs (12c) to 1.50 marks (36c.) from list prices. It is admitted that a state of extreme quiet has come about in the pig-iron trade, after buying had been somewhat more active

S. DIESCHER & SONS,
Mechanical and Civil Engineers,
PITTSBURGH, PA.

since sales for 1914 delivery were opened several weeks ago. It also turns out that the November shipments of the Syndicate reached only 82 per cent. of allotments, which compares with 92.50 per cent. for October. This is the most marked slump in the movement of pig iron that has as yet been registered.

Production of pig iron in November was also lighter than usual. The total make was 1,587,288 metric tons, as against 1,651,447 tons in the previous month, and 1,537,205 tons in November, 1912. The daily rate of production in November was 52,910 tons, or 362 tons less than in October. It appears probable that production will continue to shrink. In the Siegerland region it is reported that the furnaces are not so well employed as previously, and some have been blown out. Producers there have received from the Syndicate few orders for next quarter, and it is expected that further restrictions of production will have to be made after January 1. No inquiries for spiegeleisen from the United States are coming in, contrary to what was hitherto usual in times of prostration in the world's iron markets.

The Tube Combination

Another meeting was held here today for the purpose of completing the combination of tube manufacturers by effecting an arrangement with the Laura hütte and another Silesian company. The latter not having accepted the terms offered by the western producers, the meeting was adjourned till the late afternoon, and an "ultimatum" was served on the two concerns mentioned. It is not known at this hour what the outcome was. The manufacturers of pipe for plumbers' purposes complain of bad business, due to the prostration of the building trade. Dealers' stocks are large and manufacturers are much in need of new orders. To make matters still worse, new producers have taken up this specialty this year.

The Gutehoffnungshütte, it was announced today, will now begin the erection of blast furnaces at Diedenhofen in Lorraine. It was mentioned in this correspondence several months ago that the company had acquired land for this purpose.

Belgium again sends in news of price reductions. At the end of last week bands for export were reduced 2s. (40c.) to 116 to 118s. ($28.23 to $28.71). This, it was said, was due to German competition. At the same time Thomas pig iron was offered in the home market 2 francs (39c.) lower at 63 francs ($12.16), and Luxemburg foundry iron was also cut the same amount to 72 francs ($13.90).

Inquiry for Welsh Tin Plates

(*By Cable*)

LONDON, ENGLAND, December 23, 1913.

Iron and steel markets are in a holiday mood and buying is very light, but sentiment seems slightly improved. The Texas Oil Company is reported to be inquiring for 130,000 boxes of Welsh tin plate, apparently for re-export. Stocks of pig iron in Connal's stores are 141,374 gross tons, against 146,324 tons last week. We quote as follows:

Tin plates, coke 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 12s. 7½d. ($3.07).

(The following prices are per ton of 2240 lb.):

Cleveland pig-iron warrants (Monday), 50s. ($12.16), unchanged from one week ago.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 50s. 6d. ($12.29).

Hematite pig iron, f.o.b. Tees, 60s. 6d. ($14.72).

Ferromanganese, £9 4s. 9d. ($44.95).

Steel sheet bars (Welsh), delivered at works in Swansea Valley, £4 15s. ($23.11).

Steel bars, export, f.o.b. Clyde, £6 ($29.20).

Steel joists, 15-in., export, f.o.b. Hull or Grimsby, £5 12s. 6d. ($27.37).

Steel ship plates, Scotch, delivered local yards, £6 17s. 6d. ($33.46).

Steel black sheets, No. 28, export, f.o.b. Liverpool, £9 ($43.80).

Steel rails, export, f.o.b. works port, £6 5s. ($30.41).

(The following prices are per export ton of 1015 kilos, equivalent to 2237.669 lb.):

German sheet bars, f.o.b. Antwerp, 82s. 6d. ($20.07).

German 2-in. billets, f.o.b. Antwerp, 80s. ($19.46).

German basic steel bars, f.o.b. Antwerp, £4 11s. to £4 12s. ($22.13 to $22.37).

German joists, f.o.b. Antwerp, £5 5s. to £5 8s. ($25.55 to $26.28).

Boston

BOSTON, MASS., December 23, 1913.

Old Material.—Dealers report no change whatever. The market is very dull, with little scrap coming out. Prices are unchanged. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of $2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices:

Heavy melting steel	$7.75 to $8.00
Low phosphorus steel	13.75 to 14.75
Old steel axles	13.25 to 13.75
Old iron axles	21.25 to 21.75
Mixed shafting	12.25 to 12.50
No. 1 wrought and soft steel	9.00 to 9.25
Skeleton (bundled)	6.00 to 6.50
Wrought-iron pipe	6.50 to 7.00
Cotton ties (bundled)	7.00 to 7.25
No. 2 light	3.75 to 4.25
Wrought turnings	4.50 to 5.00
Cast borings	4.50 to 5.00
Machinery, cast	11.25 to 11.50
Malleable	8.00 to 8.25
Stove plate	7.75 to 8.00
Grate bars	6.25 to 6.50
Cast-iron carwheels	11.00 to 11.25

St. Louis

ST. LOUIS, MO., December 22, 1913.

Without much actual increase in business, the feeling is notably better, due in part to considerable tentative inquiry from consumers, together with more accurate knowledge as to their yard conditions and their contracts.

Pig Iron.—Sales of the past week have been practically all of Southern iron, among them being one of 800 tons of No. 2 to a stove manufacturer, and one of 1000 tons of malleable. Several lots of 100 to 200 tons are reported. Carload and 50-ton transactions have been quite numerous. The largest actual inquiry at the moment is one for 2000 tons of Nos. 2 and 3 Southern foundry, equally divided. Several of the stove foundries are known to be figuring on entering the market, seemingly convinced that there is little likelihood of the furnaces making further concessions. Old inquiries still in the market, which could be filled at $10.50, remain uncovered. On No. 2 Southern foundry, Birmingham basis, $11 is the figure still held and this only for the first quarter, furnaces' representatives having no instructions to take beyond that time. A large tonnage, however, might be placed for first half at that figure.

Old Material.—A better feeling prevails among the dealers and a few prices have been revised upward during the week, but not in large degree. Dealers are inclined, in a small way, to buy against some of their unfilled contracts, but no great quantities are being laid down. The market continues under the influence of purely local conditions, as there is no demand of moment from the outside to enliven competition for material. We quote dealers' prices, f.o.b. St. Louis, as follows:

Per Gross Ton

Old iron rails	$10.25 to $10.75
Old steel rails, rerolling	11.00 to 11.50
Old steel rails, less than 3 feet	9.25 to 9.75
Relaying rails, standard section, subject to inspection	23.00 to 24.00
Old car wheels	10.25 to 10.75
No. 1 railroad heavy melting steel scrap	8.75 to 9.25
Shoveling steel	7.75 to 8.25
Frogs, switches and guards cut apart	8.75 to 9.25

Per Net Ton

Iron angle bars	$8.75 to $9.25
Steel angle bars	8.00 to 8.50
Iron car axles	15.75 to 6.25
Steel car axles	10.25 to 10.75
Wrought arch bars and transoms	10.25 to 10.75
No. 1 railroad wrought	7.75 to 8.25
No. 2 railroad wrought	7.25 to 7.75
Railroad springs	8.00 to 8.50
Steel couplers and knuckles	8.00 to 8.50
Locomotive tires, 42 in. and over, smooth	9.00 to 9.50
No. 1 dealers' forge	6.25 to 6.50
Mixed borings	2.25 to 2.75
No. 1 busheling	6.25 to 6.75
No. 1 boilers, cut to sheets and rings	3.25 to 3.75
No. 1 cast scrap	9.00 to 9.50
Stove plate and light cast scrap	6.75 to 7.25
Railroad malleable	6.75 to 7.25
Agricultural malleable	6.25 to 6.75
Pipes and flues	4.25 to 4.75
Railroad sheet and tank scrap	3.25 to 3.75
Railroad grate bars	5.75 to 6.25
Machine shop turnings	3.25 to 3.75
Bundled sheet scrap	3.75 to 4.25

Announcement

Some features of the Annua Review Number of The Iron Age, to be issued January 1, 1914.

¶ For the opening of the year an issue unusually large and varied in contents has been for many years an "Iron Age" institution.

¶ That for January 1, 1914, in amount and value of reading matter, is worth a word in advance. We do not forget that the amount of white paper involved in next week's issue—something less than four pounds to the copy—means the risk of some article being overlooked. Hence this reminder.

Among other contents these:

¶ Thirty pages of statistical matter and comment on the iron and steel trades in 1913, which stands out as the **annus mirabilis** in the history of the industry. With this section go the well-known **Iron Age** charts in colors, showing the fluctuations in iron and steel prices for the sixteen years, 1898-1913. There is also a record of the additions to iron and steel capacity in 1913 and those under way.

¶ Three noteworthy illustrated articles describing iron and steel plants—the Inland Steel Company's important improvements of the past two years, the new Edgar Thomson open hearth plant of the Carnegie Steel Company, and the new works of the Wheeling Sheet & Tin Plate Company.

¶ Progress in the Metallurgy of Iron and Steel in 1913 is excellently reviewed by Bradley Stoughton.

¶ As an example of advanced welfare work in the steel industry, a seven-page article, with 10 illustrations, describing the American Steel & Wire Company's methods at its South Works, Worcester, Mass.

¶ An article on the American Chain Company's new factory at Bridgeport, Conn., full of suggestion as to factory construction and operation, with special details of a highly developed routing system.

¶ Details of a striking feature of the Ford Motor Company's methods. Since it took on the average 2 hr. and 10 min. to hire a man and set him at work in a department—or $40,000 a year for the 5000 men a month who formerly were taken on, it became important to find ways to cut down the number of changes. This is well told.

¶ Chile as a Factor in Panama Canal Trade. Illustrated correspondence from Charles M. Pepper, for eight years foreign trade expert of the State Department at Washington. Chile's iron ore deposits (Bethlehem Steel Company) and her efforts to establish an iron industry are of special interest just now.

¶ Views of an American engineer, who in two years' residence abroad bought materials and machinery from the United States, England and Germany. He says: "The best packing I had came from the United States"—something the critics of American failings in exports might take to heart.

¶ "Some Prime Principles of Salesmanship," "Cooperation for Shop Efficiency," and "Cost Problems of Jobbing Foundries" are titles of other articles that may well have the attention of managers in all metal-working lines.

¶ A dozen other features of next week's "Iron Age" might be named, and every one of the dozen would be worth hunting up and reading.

Coke.—Quite a number of small sales were made, but the quantities were such that prices charged were above the market for good-sized lots. One contract for first half for about 600 tons was closed. By-product coke commands about $5.30 to $5.40 per net ton, delivered St. Louis.

Finished Iron and Steel.—A large number of inquiries have appeared, but they have been for small quantities. However, they are regarded as indicating a better state of affairs. Fabricating shops are fairly busy, but no important contracts are in sight except a prospect at Kansas City for a large hotel, for which bids are expected to be asked about the middle of the month. No standard steel rails have been sold and only a small tonnage of light steel rails. Track fastenings are very quiet. A number of small car orders are being figured, special requirements which would come into the market almost regardless of conditions, but the plate tonnage for these will not be heavy and plates continue weak. Bars are quiet, both ordinary and reinforcing.

Buffalo

BUFFALO, N. Y., December 23, 1913.

Pig Iron.—Sales have been light. Orders booked consist mainly of carload and 100-ton lots, although two or three sales of 200 tons are noted. The aggregate for the week did not exceed 5000 tons of all grades. One producing interest of the district reports slightly better indications of a revival of interest among buyers, but, generally speaking, buying has come almost to a standstill. A good many melters in tributary territory are closing down over the holiday season and some of them for a longer period. The table given below, which represents prices f.o.b. furnace, closely approximates current transactions for first quarter delivery. For delivery distributed over the first half prices are somewhat stronger than for first quarter:

No. 1 foundry	$13.00 to $13.50
No. 2 X foundry	13.00 to 13.25
No. 2 plain	12.50 to 12.75
No. 3 foundry	12.25 to 12.50
Gray forge	12.00 to 12.25
Malleable	13.00 to 13.50
Basic	13.25 to 13.75
Charcoal	15.50 to 16.50
Charcoal, special brands and analysis	17.00 to 19.50

Finished Iron and Steel.—The general tone of business in finished products is better. While ordering is done in small lots only, there is less pessimistic feeling than a week or two ago. More inquiry is being received and the outlook for a fair volume of buying immediately after the inventory period is improving. In nearly all lines, including sheets, cold-rolled steel, chain, etc., as well as steel bars, shapes and plates, orders to supply current necessities are coming in quite freely. While 1.25c. Pittsburgh is being obtained on steel bars for small lots, for larger tonnages 1.20c. is the prevailing price. For structural plates and shapes the ruling price is 1.25c. for such business as is running. Large orders, if offered, would undoubtedly secure some shading of this price. The attitude of mills and agencies on contracts for forward deliveries is that they will not be accepted at these low prices. In fabricated structural lines a fair volume of small business continues to come out, and a larger volume is expected to develop after the first of the coming year. The Charles F. Ernst Sons Iron Works has received contracts for 150 tons of steel for a theater for the Mack-Brock Amusement Company, Buffalo, and 100 tons for a wholesale liquor warehouse for Persons & Sons, Buffalo. It was low bidder for 125 tons for enlargement of the Erie County jail. The Lackawanna Bridge Company has received contract for steel for the Order of the Eagles club house, Buffalo, 200 tons, and the Buffalo Structural Steel Company has contract for a club house for the Order of the Orioles, Buffalo, 150 tons. The latter company has also secured contract for steel for the remodeling of the Lafayette Theater, Buffalo, 100 tons, and for an addition to the brew house of the International Brewing Company, 100 tons. Bids are being taken this week for a warehouse for Morrison & Risman, Buffalo, requiring a small tonnage

Old Material.—Considerable activity locally has been shown in the last few days in nearly all lines of scrap. A sale of about 200 tons of carwheels is reported at $10.75. While the activity noted may possibly be only a temporary spurt, dealers are nevertheless much encouraged, as they did not look for any demand until January. Prices offered have not been attractive enough to dealers to secure their acceptance of anything more than small orders, dealers believing that on account of low stocks at consuming points better prices will prevail within a short time. Prices quoted for current delivery are as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	$9.75 to $10.50
Bundled sheet scrap	6.00 to 6.50
No. 1 busheling scrap	8.50 to 9.00
No. 2 busheling scrap	6.00 to 6.50
Low phosphorus steel scrap	15.00 to 15.75
Iron rails	15.00 to 15.50
No. 1 railroad wrought	12.00 to 12.50
No. 1 railroad and machinery cast scrap	12.00 to 12.50
Steel axles	17.00 to 17.50
Iron axles	22.50 to 23.00
Carwheels	10.75 to 11.25
Railroad malleable	10.50 to 11.00
Locomotive grate bars	9.50 to 10.00
Stove plate (net ton)	9.75 to 10.00
Wrought pipe	8.50 to 9.00
Machine shop turnings	5.00 to 5.50
Heavy steel axle turnings	8.00 to 8.75
Clean cast borings	5.50 to 6.00

New York

NEW YORK, December 24, 1913.

Pig Iron.—In tonnage the pig-iron business closed by local offices in the past week was more satisfactory than that of the preceding week, but prices yielded and the buying was limited to a few consumers. The 6000 tons of basic iron for Bridgeport, Conn., on which inquiry came up two or three weeks ago, has now been closed, the business going to a Lehigh Valley maker. Several deals in foundry iron have been put through quietly, buyers contracting with the makers who have usually supplied them. With what has been closed in eastern Pennsylvania it is probable that 30,000 to 35,000 tons of basic has been placed with Eastern furnaces in the week. Quietness in the machinery trades has worked back to jobbing foundries and the melt of pig iron is considerably reduced. However, there is an expectation of some improvement when the early January contracts for castings are considered. The average foundry is not buying and it is evident that in most cases pig iron contracted for will carry melters through January. Some buying of furnace coke is reported at $2 and a shade lower at oven. Some inquiry for pig iron for shipment to the Mediterranean has come to this country, British prices having advanced slightly. Little Southern iron is coming into the East, though rather more inquiry is reported by Alabama furnaces from other districts. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, $15 to $15.50; No. 2 X, $14.75 to $15.25; No. 2 plain, $14.50 to $14.75. Southern iron is quoted at $15.25 to $15.75 for No. 1 foundry and $15 to $15.25 for No. 2.

Finished Iron and Steel.—Consumers have not as yet made many advances toward contracts for 1914, and from the makers' standpoint there appears to be almost a concerted objection toward closing any contracts. On the whole there is evidence of the effort to hold up prices, though the occasional instance is still noted of small contracts altogether favorable to the buyer. A few contracts involving each about 200 tons have been closed by one steel maker for bars for the first quarter at 1.25c., Pittsburgh, but a quotation of 1.20c., Pittsburgh, has been made by still another company for 200 tons delivered over the first half. Two small contracts for plates for six months of 1914 have been signed at 1.20c., Pittsburgh. One quite encouraging sign in the structural field is that one of New York's structural engineers has lately had numerous inquiries, including some from speculative building interests, which fact is taken to indicate the possibility of a more favorable attitude among those financing these projects than has been the case for some time. The Grand Trunk has made quite a holiday distribution of its 1000 freight cars and 125 passenger equipment cars as follows: 50 passenger cars to the Canadian Car & Foundry Company; 500 flat cars and 5 mail cars to the Pressed Steel Car Company; 15 passenger cars to the American Car & Foundry Company; 32 passenger cars to the Osgood-Bradley Car Company; 4 dining cars and 5 parlor cars to the Pullman Company, and 10 baggage and 500 stock cars to the National Steel Car Company, Hamilton, Ont. The American Car & Foundry Company has taken 18 passenger cars for the Louisville & Nashville and the Standard Steel Car Company 7 passenger cars for the Erie. The Florida East Coast is expected to come into the market in January for 2000 ventilated box cars. Awards in the structural field include 600 tons for the Jacobs loft building, 226 West Seventh street, to the Belmont Iron Works; 300 tons for the Nichols Copper Company, Astoria, New York City, to the George A. Just Company, which has also 200 tons for the New

York Telephone Company, Flatbush; 200 tons for the Willimantic (Conn.) high school, to the Berlin Construction Company; 300 tons for an ice and coal storage building, Boston, to the New England Structural Company, and 2000 tons for the Yale Club, to Post & McCord. It is understood that the American Bridge Company has 400 tons for three bridges for the Lehigh Valley and also 600 to 700 tons for the Empire Building, Augusta, Ga., the Whitney Company, general contractor. A lift bridge over the Passaic River, 800 tons, is also reported closed, and Wells Brothers Company is low bidder for the Emergency hospital, Washington, D. C., involving 500 to 600 tons. It is estimated that about 4000 tons of sheet piling will be required for the 1000-ft. pier, New York. Quotations remain at last week's figures, although it is admitted that on attractive offerings the prices could be shaded $1 a ton, and they are as follows: Steel bars, plates and plain structural material, 1.20c. to 1.25c., Pittsburgh, or 1.36c. to 1.41c., New York; refined iron, 1.30c. to 1.35c., New York; iron and steel bars from store, 1.90c. to 1.95c., and shapes and plates, 1.95c. to 2c.

Ferroalloys.—The small amount of business that is being done is in small lots for quick delivery. While inquiries for 80 per cent. ferromanganese for delivery next year are numerous and for substantial amounts, no contracts are reported closed. It is the feeling among some purchasers that the present price of $47, Baltimore, may be lowered, and therefore contracting for future requirements is slow. German ferromanganese, which formerly was quoted about 50c. a ton lower than the English, is now held at the same price, with the assurance of equally low phosphorus content. The leading steel interest is in the market for 6000 to 8000 tons of 50 per cent. ferrosilicon. While prices for the remainder of the year remain the same as in the past few weeks, quotations beginning January 1 will be reduced $2 per ton and they will then stand $73, Pittsburgh, for carloads; $72 for 100 tons, and $71 for 600 tons and over.

Cast-Iron Pipe.—F. A. Houdlette & Son, Boston, were low bidders, at $23.10 delivered, on about 250 tons of 4's to 8's, opened December 21, at Medford, Mass. The water department of Schenectady, N. Y., opens bids today on about 1500 tons of 36-in. Private buying is light, and inquiries are few. Pipe foundries in this vicinity are pretty generally shut down for the holidays. Carload lots are quoted at $22 to $23 per net ton, tidewater, for 6-in.

Old Material.—This market shows no improvement, either in sales or inquiries. Holders of scrap are apparently settling down to a determination not to part with what they have at present prices or lower, trusting that the opening months of the coming year will bring some improvement. A typographical error was made last week in the quotations on cast borings and wrought turnings, which should have been as given below. Quotations are nominally as follows, per gross ton, New York:

Old girder and T rails for melting	$7.50 to	$8.00
Heavy melting steel scrap	7.50 to	8.00
Relaying rails	20.50 to	21.00
Rerolling rails	10.00 to	10.50
Iron car axles	18.50 to	19.50
Steel car axles	12.50 to	13.00
No. 1 railroad wrought	10.25 to	10.75
Wrought-iron track scrap	9.00 to	9.50
No. 1 yard wrought, long	8.50 to	9.00
No. 1 yard wrought, short	7.75 to	8.25
Light iron	2.50 to	3.00
Cast borings	4.75 to	5.00
Wrought turnings	4.50 to	4.75
Wrought pipe	6.75 to	7.25
Carwheels	10.50 to	11.00
No. 1 heavy cast, broken up	10.00 to	10.50
Stove plate	7.00 to	7.50
Locomotive grate bars	6.50 to	7.00
Malleable cast	7.00 to	7.50

Metal Market

NEW YORK, December 24, 1913.

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York			Lead		Spelter	
Dec.	Lake.	Electro-lytic.	Tin, New York.	New York.	St. Louis.	New York.	St. Louis.
18	14 62½	14.25	37.20	4.00	3.87½	5.15	5.00
19	14.62½	14.25	37.10	4.00	3.90	5.15	5.00
20	14.62½	14.25	37.10	4.00	3.92½	5.15	5.00
22	14.62½	14.30	36.87½	4.00	3.95	5.15	5.00
23	14.62½	14.37½	36.65	4.00	3.95	5.15	5.00
24	14.62½	14.37½	36.65	4.10	3.95	5.15	5.00

Lake copper is a little easier, but electrolytic is unchanged and quiet prevails in both. Dealing in tin has been light and the price is lower. Lead is stronger in New York and in the West is higher. Spelter has a trifle more strength, despite a quiet demand. Antimony is without change.

New York

Copper.—There has been little or no business in Lake, but the market has softened and there are well-authenticated reports that quiet offerings have been made at from 14.62½c. to 14.75c., cash, according to brands. In electrolytic, the business done has been almost entirely for export, although the sales for foreign shipment have been less than they were last week. The electrolytic price quoted today, 14.37½c., cash, and the price earlier in the week, 14.25c., were made by second-hands, but the business done by them was of short duration and not of large volume. The slightly better tone of to-day is attributed to buying for export. Rumors had it that this buying, and that by domestic consumers as well, reached large proportions, but such reports are very much doubted by the trade, and it is intimated that sellers are anxious to create a sentiment that will induce domestic consumers to come forward, but that so far they have not responded to any great extent. Spot is quoted in London to-day at £64, 15s., and futures at £65, 5s. Exports this month total the excellent amount of 25,680 tons.

Pig Tin.—On Friday between 200 and 250 tons was dealt in, and on Saturday between 300 and 400 tons changed hands, but otherwise the market has been quiet. Practically all of the metal sold on the days mentioned was for future delivery and the buying was about evenly distributed between consumers and dealers. The activity in London has continued to decline in a disappointing way and therefore it is believed that not all orders taken here were cabled abroad, but that some were taken with the intention of going short of the metal. The news from London is of a pessimistic character and possibly has suggested speculation in the direction indicated. The London quotations to-day are £167, 10s. for spot and £169, 5s. for futures. Arrivals in December total 2279 tons and there is afloat 1910 tons.

Lead.—The market has a better tone as a result of the buying of a week ago. Since then, however, business has fallen off decidedly and the market is quiet. Outside sellers are not as eagerly seeking business as they were a few weeks ago and all have quoted higher than the American Smelting & Refining Company, and therefore this company obtained what current business there was. The independents are understood to be comfortably filled with orders, most of which they booked at higher than present prices. The St. Louis quotation today is 3.95c., there having been gradual advances in the last week from 3.85c. The New York price was advanced to-day to 4.10c. by the American Smelting and Refining Company.

Spelter.—The only feature in this metal is that buyers are disinclined to buy prompt deliveries and the sellers will not sell futures. The market is a trifle stronger, but nominal at 5.15c. to 5.20c., New York, and 5c. to 5.05c., St. Louis.

Antimony.—This metal is unchanged, with quotations at 7c. to 7.25c. for Hallett's, 7.40c. to 7.50c. for Cookson's, and 6c. to 6.50c. for Chinese and Hungarian grades. There is considerable surplus stock on the market yet to be absorbed.

Old Metals.—Dullness continues. Dealers' selling quotations are nominally as follows:

	Cents per lb.
Copper, heavy and crucible	14.00 to 14.25
Copper, heavy and wire	13.50 to 13.75
Copper, light and bottoms	12.25 to 12.50
Brass, heavy	8.50 to 8.75
Brass, light	7.50 to 7.75
Heavy machine composition	12.25 to 12.50
Clean brass turnings	8.50 to 8.75
Composition turnings	10.75 to 11.00
Lead, heavy	3.90
Lead, tea	3.65
Zinc, scrap	4.10

Chicago

DECEMBER 22.—Influenced by heavy selling of copper in foreign markets, the domestic situation in the past week has again shown some evidence of firmness and prices have been maintained without change. A fractional decline in tin prices and some concessions in lead are reported. We quote as follows: Casting copper, 14.75c.; Lake copper, 15c., for prompt shipment; small lots, ¼c. to ⅜c. higher; pig tin, carloads, 38c.; small lots, 40c.; lead, desilverized, 3.95c., and corroding, 4.20c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.10c. to 5.15c.; Cookson's antimony, 9.50c.; other grades, 8c.; sheet zinc, $7.25, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 12c.; copper bottoms, 10.50c.; copper clips, 11.50c.; red brass, 10.75c.; yellow brass, 7.75c.; lead pipe, 3.50c.; zinc, 3.60c.; pewter, No. 1, 23c.; tin foil, 28c.; block tin pipe, 31c.

St. Louis

DECEMBER 22.—There has been a slightly better tone in the metal market, with special relation to the Missouri product. We quote as follows: Lead, 3.90c.; spelter, 5c. to 5.05c.; Lake copper, 15.35c. to 15.85c.; electrolytic copper, 14.72½c. to 14.85c.; tin, 37.22½c. to 37.60c.; Cookson's antimony, 7.80c. to 7.95c. In the Joplin zinc ore market there was a slightly better feeling, the basis price ranging from $37 to $40 per ton for 60 per cent., with the top settlement at about $43. Calamine ranged from $18 to $20 for 40 per cent., with the best settlement at $23.50. Lead ore was dull at $48 for 80 per cent. We quote miscellaneous scrap metals as follows: Light brass, 4.50c.; heavy yellow brass, 7c.; heavy red brass and light copper, 9c.; heavy copper and copper wire, 10.50c.; zinc, 2.75c.; lead, 3c.; pewter, 22c.; tinfoil, 28c.; tea lead, 2.75c.

Iron and Industrial Stocks

NEW YORK, December 24, 1913.

Prices of securities have moved up sharply partly because of the passage of the banking and currency bill and partly because of a more hopeful sentiment as to general business. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chalm., com...	7⅛- 8½	Nat. Enam. & St., com....	10¾
Allis-Chalm., pref...	40½- 41½	Nat. En. & St., pref.....	77
Am. Can, com.....	26 - 30⅜	Pressed Steel, com..	25¾- 26½
Am. Can, pret.....	86¾- 90	Railway Spring, com.	24⅛- 24¾
Am. Car & Fdy., com.	43¼- 44¾	Republic, com.....	19½- 20¼
Am. Car & Fdy., pref.....111¾		Republic, pref.....	78¼- 81⅞
Am. Loco., com.....	28⅛- 30⅜	Rumely Co., com.....	14
Am. Loco., pref.....	97½- 98	Rumely Co., pref....	33 - 34½
Bald. Loco., com....	39 - 39½	Sloss, com.....	25¼- 29
Beth. Steel, com....	29¼- 31	Pipe, com.....	10¾
Beth. Steel, pref....	67¼- 68¾	Pipe, pref.....	40
Case (J. I.), pref.....	91	U. S. Steel, com...	55⅛- 59¾
Colorado Fuel	27 - 29	U. S. Steel, pref....104⅝-106¼	
Deere & Co., pref...	92 - 93½	Westinghouse Elec..	63 - 65½
General Electric ...134¾-140¾		Am. Ship, com.....	35
Gt. N. Ore Cert....	31 - 35⅝	Chic. Pneu. Tool....	50⅞- 51⅛
Int. Harv., com.....100¼-103½		Cambria Steel.....	47 - 48
Int. Harv., pref.....114		Lake Sup. Corp.....	22
Int. Harv., Corp....100½-103½		Crucible Steel, com..	13⅜- 14¼
Int. Harv., Corp., pref....114		Crucible Steel, pref.	87 - 87½
Int. Pump, com.....	5⅛- 6¾	Harb. Walk Ref., pref....	99
Int. Pump, pref....	16½- 18	La Belle Iron, com.....	40

Dividends Declared

The American Locomotive Company, regular quarterly, 1¾ per cent. on the preferred stock, payable January 21.

The Canadian Car & Foundry Company, regular quarterly, 1¾ per cent. on the preferred stock, payable January 26.

The E. W. Bliss Company, regular quarterly, 2 per cent. on the preferred stock, payable January 2.

The Garvin Machine Company, regular semi-annual, 3½ per cent. on the preferred stock, payable January 1.

The General Fireproofing Company, regular quarterly, 1¾ per cent. on the preferred and 1¾ per cent. on the common stock, both payable January 1.

The National Enameling & Stamping Company, regular quarterly, 1¾ per cent. on the preferred stock, payable December 31.

The Standard Coupler Company, 2 per cent. on the common and 4 per cent. on the preferred stock, both payable December 24.

The Taylor-Wharton Iron & Steel Company, regular quarterly, 1¾ per cent. on the preferred stock, payable February 2.

The Union Switch & Signal Company, regular quarterly, $1.50 a share on both the common and preferred stock, payable January 10.

The Walworth Mfg. Co., regular quarterly, 3 per cent., payable December 31.

The Westinghouse Air Brake Company, regular quarterly, $2 a share, payable January 15.

The Yale & Towne Mfg. Company, regular quarterly 1½ per cent. and special 1 per cent., payable January 2.

Manning, Maxwell & Moore, Inc., regular quarterly, 1½ per cent., payable December 31.

The Prime Steel Company, Milwaukee, Wis., is installing a mold-drying oven, 20 x 24 ft., coke fired, and a car-type annealing oven, 10 x 12 ft., oil fired. Arthur L. Stevens was the designing engineer and is also in charge of construction.

Lehigh Valley Safety Organization

Lehigh Valley Local Council No. 5 of the National Council for Industrial Safety was formally organized at a recent meeting at the offices of the Bethlehem Steel Company, South Bethlehem, Pa. One of the principal functions of the National Council, the organization of which was referred to in *The Iron Age* of November 6, page 1085, is the promotion, through its members in various districts, of local councils. Some weeks ago W. F. Roberts, general superintendent Bethlehem Steel Company, called a meeting of the heads of such industrial companies in the Lehigh Valley and vicinity as were interested in the general movement for "Safety First." A second meeting followed early in December at which the organization of a local council was completed and officers were elected as follows:

W. F. Roberts, Bethlehem Steel Company, president.

F. P. Sinn, New Jersey Zinc Company, first vice-president.

W. R. Dunn, Vulcanite Portland Cement Company, second vice-president.

G. T. Fonda, Bethlehem Steel Company, secretary and treasurer.

The following committees were named for the coming year:

On programme—R. H. Sweetser, chairman, Thomas Iron Company, Easton, Pa.; W. W. Kuntz, Atlas Portland Cement Company, Northampton, Pa.; J. W. Lauder, Nazareth Cement Company, Nazareth, Pa.; A. H. Cantlin, Lehigh Valley Light & Power Company, Allentown, Pa.; F. P. Sinn, New Jersey Zinc Company, Palmerton, Pa.

On membership and publicity—M. Fortuin, chairman, Pennsylvania Cement Company, Bath, Pa.; F. E. Kutz, Ingersoll-Rand Company, Easton, Pa.; M. O. Knauss, Empire Steel & Iron Company, Catasauqua, Pa.; J. Geo. Lehman, Bethlehem Foundry Machine Company, South Bethlehem, Pa.; H. G. Barnhurst, Fuller Engineering Company, Allentown, Pa.

On constitution and by-laws—R. P. Hutchinson, chairman, Guerber Engineering Company, Bethlehem, Pa.; W. C. M'Kee, Thomas Iron Company, Hokendauqua, Pa.; A. Hochstrasser, Whitehall Portland Cement Company, Phillipsburg, N. J.; H. T. Gerdis, Treadwell Engineering Company, Easton, Pa.; G. T. Fonda, Bethlehem Steel Company, South Bethlehem, Pa.

Lehigh Valley Local Council No. 5 has been organized primarily for the purpose of mutual conference, aid and helpfulness in matters pertaining to the conservation of human life among the industrial organizations of its section; and to participate in and aid any other activities for the welfare of the industrial workers in the Lehigh Valley and vicinity. Plans are now under way for an active campaign. Seventeen important companies are already enrolled as members.

The New York Central Iron Works has been incorporated by Odello D. McCardell, Daniel A. Stickell and L. D. Perry. The principal office is to be located in Hagerstown, Md. The capital stock is given as $225,000. The corporation is to be managed by nine directors as follows: M. P Moller, Odello D. McCardell, Charles L. Wagaman, and William Wingert, Hagerstown; L. D. Perry, Harrisburg, Pa.; O. J. C. Rose, Geneva, N. Y.; A. H. Nichols, Auburn, N. Y.; H. B. Hirsh, Philadelphia; and C. E. Whipple, Hagerstown. These directors will manage the company the first year.

The Mining and Metallurgical Society of America will hold its sixth annual meeting at the Engineers' Club, New York, January 13, 1914. A meeting of the New York section, to discuss the one-man drill, will be held at the Engineers' Club on the evening of December 18. The society has awarded its gold medal for 1913 to Herbert C. Hoover, Bewick, Moreing & Co., London, England, and Lou Henry Hoover, in recognition of their contributions to the literature of mining.

The Republic Iron & Steel Company has opened a branch sales office at 625 Ford Building, Detroit, Mich., in charge of C. S. Powers.

The Worm and Wheel as a Drive *

What Is to Be Considered in Design—Various Applications of the Drive

BY E. J. LEES†

While the worm and wheel have been used for drives more or less successfully for a good many years, it is only recently that the general public has been interested in them, and this is largely due to the automobile manufacturers who are using, investigating and advertising cars with worm wheel drives.

It is true that machine tool manufacturers and others have used worms and wheels for reduction drives, but there has always been a certain amount of criticism and disfavor in regard to their use. When we consider the design and shop practice that was used in some cases, in comparison with that which is possible today, it is very apparent that the criticism was just.

Papers have been written regarding the theory and numerous tests have been made which prove that if properly mounted, and all materials, lubrication, etc., are as nearly correct as possible, that an efficiency of 93 per cent. is possible and some claims are made for even higher than this.

In view of this it seems best not to go into the same paths of investigation any further than necessary, but to bring out if possible other vital points which are incidental, not only in the design, but in the manufacture.

Applications to Metal Working Machinery

At the Ingersoll Milling Machine Company's plant at Rockford, Ill., worms and wheels have been successfully used with dimensions as follows: The worm is 5½ in. outside diameter, 1¼-in. circular pitch, 4 threads, 5-in. lead, angle of 18 deg. 26 min., pressure angle 14½ deg., the depth of tooth conforming to the normal pitch, which is 1.186 in., making the whole depth of tooth about ¾ in. The wheels have 50 teeth and some are made of bronze of the following analysis: Tin, 12.52; lead, 2.205; copper, 84.00; zinc, 1.24; phosphorus, 0.035.

These worms of steel and wheels of bronze have been driving the horizontal cutter spindles of a large milling machine in the plant for the last 14 years without being replaced. One of the steel worms and a cast-iron worm wheel have been operating a large screw press for broaching and inserting teeth in the cutters which they manufacture. The pulley on the worm is 18 in. in diameter and has a 10-in. driving belt. This drive has been in continuous use 17 years and the worm wheel seems to be in good shape yet.

From the above it is reasonable to assume that a worm with a thread angle from 17 to 43 deg. will be successful, but there is one feature that must be taken into consideration, and this is the pressure angle of the thread. As the number of threads used in the worm is increased to get more lead and therefore more angle of thread, the pressure angle of the tooth should also be increased. If this is not done, the peculiar warped nature of the worm will not allow very much of the wheel to intersect with its teeth and will undercut them with a consequent loss of surface contact, which contact should be as great as possible.

Points of Design

Consider a blank with rings on it, then a thread; now add other threads, and the angle of thread will gradually increase until at a maximum we have a spur pinion, threads or teeth having changed 90 deg. and at either extreme, it is very apparent that there will be no efficiency in a line parallel with the axis; and in regard to tooth contact it is clear that as the threads increase the action between the worm and wheel will be less until at the extreme or spur pinion all the teeth would be cut away in the wheel. Because the action between the worm and wheel teeth is largely sliding, it stands to reason that the area of contact in these teeth is governed to a large extent by the ratio, which is also controlled by the number of threads in the worm. And if an efficient angle is used the width of face of the wheel must be narrower as the angle increases; this statement is made assuming the wheel to conform to the worm and be made by the process known as hobbing.

If the face is made too wide the hob will cut away the ends of the teeth on the wheel to a point, but the greater pressure angle will eliminate this to some extent and allow more width and therefore more surface contact. To my mind the correct surface contact of the teeth in a worm and wheel is a most vital point and a correct design may be spoiled by incorrect contact of the teeth, due to any factor in their manufacture and assembly.

In gearing in general, eccentricity is one of the great sources of trouble; this must be guarded against in making the worm, the wheel, and especially the hob. The worm wheel must not only run true on its pitch diameter but must be bored perfectly true and not run out sideways. Designers may differ as to the form of tooth to use, but regardless of this whatever form is used, the best results will be obtained by making the hob in identically the same manner as the worm is going to be made; that is, as far as the tooth form is concerned. After this outline is obtained, of course, the hob may be relieved, but the relieving tool should be made to conform to the thread as made on the worm, working to the normal section. I mention this because so many hobs are ordered from a cutter maker who makes a relieving tool for a lathe according to his own ideas, and at the same time some shop is producing worms with threads that may or may not mesh correctly with a wheel cut with a hob. The above is all on the basis of trying to obtain the maximum efficiency and does not apply to very light loads and intermittent action.

As stated before, the action of a worm and wheel when transmitting is largely a sliding contact, and for all good sliding surfaces used in machine tool construction, the two surfaces are scraped together, and as a rule have a liberal area. The worm and wheel, on the contrary, are subjected to extreme pressure and are very seldom scraped together. If the cost of production will allow this, it is a very good plan to make the worm as perfect as possible in regard to concentricity and uniformity of teeth in size and indexing, with a very smooth surface after hardening, which even if ground should then be polished. Then mate the worm and wheel together in a fixture that will allow of center adjustment, and scrape the bronze wheel to conform to the worm, using the regular methods of red leading or bluing the thread of the worm to find the contact on the teeth of the wheel to be scraped. The above appears to be a refinement which will be very expensive, but when you stop to consider the cost of inspecting and grinding in and other precautions that are used in comparison, probably is not so extreme as at first may appear, for it has the advantage of being successful; is based on the contact with a worm whose outline can be defined, and if these worms are exact duplicates, is interchangeable, a thing that is an absolute impossibility by any method of lapping or grinding where two surfaces are allowed to change haphazard in the process.

The need of interchangeability of parts manufactured in the modern shops of today has been the cause of the development of manufacturing down to extreme limits, measuring and testing machines, and the education of mechanics who are capable of producing to these limits; so that today we find a machine so delicate and accurate that it will measure the balls used in a ball bearing down to fractions of a thousandth of an inch, and ball races being ground so accurately that all the balls may do their share of the work and therefore make the ball thrust a success, where formerly it was condemned on account of a ball crushing. This was to be expected when you consider that the balls varied in diameter and were placed in supposedly parallel bearings so that when the large ball came to the tight side of the ball race it alone had to take all the thrust and either crushed or scored up the ball race. Now that balls are made uniform and double spherical seats are used for the races, this is all eliminated.

The Use of Ball Bearings with the Drive

The question might consistently be asked at this point why the spherical seats if the machine work and the balls are accurate, and the answer is that the burden of accuracy is constantly changing and at the present time is up to the material used and the strenuous work the mechanism has to do will often create a flexibility that

*From a paper read before the Cleveland Engineering Society, December 2, 1913.

†President Lees-Bradner Company, Cleveland, Ohio.

must be taken care of. This brings us to the shafts on which the worm and wheel are mounted and the ball bearings used here should be of the self-aligning type, as this will readily take care of alignment and flexibility.

It is very evident that the ball bearing is destined to be a most important factor in the success of the worm and wheel as a drive. That the friction between the teeth of worm and wheel is not as great as many writers believe was brought home to my mind the first time I saw the boom of a locomotive crane revolve the worm of the hoisting mechanism backward through the wormwheel.

The Drive Applied to Elevators

Elevator manufacturers use the worm and wheel to a large extent, and to do away with a ball bearing thrust one has adopted a rather ingenious arrangement in which each motor drives a shaft upon which is securely doweled a right hand and a left hand worm that mesh with two wormwheels, one mounted upon the drum shaft and the other upon the idler shaft. There are also bolted to the wormwheels two straight gears, which are larger than the wormwheels and mesh together. The motors are arranged to run in opposite directions, both running in for raising or out for lowering. In this way there is no side thrust on the drum bearings, and the usual end thrust, present with the ordinary arrangement of worm and wormwheel, is taken care of by the two worms mounted upon each driving shaft, the thrust of each worm just balancing that of the other. In this way the thrusts and sidestrains are so nicely balanced that the item of friction, usually a heavy one in this type of gearing, is greatly reduced.

Some elevator manufacturers use an arrangement somewhat similar, but in place of the wormwheels with spur gears bolted at their side, use two large helical gears right and left hand meshing together. In the central part of each a slight throat has been hobbed to make a seat for two worms to mesh with right and left hand. At first glance it looks as though it would be a rather hard problem to make the two worms mesh correctly with the two helical gears, because the two worms are cut on the same shaft. But on further inspection it is perfectly clear that all that is necessary is to turn the worms around until the lead of the thread brings the teeth of the wheel opposite the space in the worm thread, an allowance being made in the over-all length of the shaft for adjustment. Of course the angle of the teeth in the helical gear must be the same angle as the thread of the worm, so that after the helical gears are cut they can be hobbed without the hob interfering with the teeth already cut and yet make a correct seat with which the worm may mesh.

In summing up I will say that from all indications the worm and wheel as a drive will become more popular and more successful when it is thoroughly understood that all the factors which enter into its design and manufacture must be carefully looked into. There is certainly no doubt that the manufacturers of machine tools are doing their part to make machines which, if handled properly, will produce down to limits of extreme accuracy. The ball bearings which are now on the market meet the requirements demanded of them. The measuring machines are capable of measuring down finer than required. So we might conclude by saying that with a good design and manufacture there is no reason why the worm and wheel as a drive should not be a success.

Book Review

The Glue Book. By J. A. Taggart. Pages. 85, 4¾ x 7½ in. Published by the author, Toledo, Ohio. Price, $1.

The purpose of this manual, which is the first of its kind that has been published, is to provide a practical guide for glue users, with a view to eliminating waste and improving the quality of the product. It is estimated that 70 per cent. of the glue used in the United States is improperly handled, while the actual waste is said to be in excess of 25 per cent., in addition to the loss due to the imperfect condition of the completed work. It is intended as a handbook for the glue user who is interested in increasing the efficiency of his operations and technical expressions have been avoided, the whole matter being set forth as clearly as possible in the every-day terms in familiar use in the glue room. It is not claimed for the book that any new facts are disclosed, but the object aimed at is rather the assembling, in handy and easy reference form, of a summary of the best modern practice upon which the glue user of today may rely as a safe and convenient guide.

After a brief historical introduction to the industry, the manufacture of glue is taken up, together with the methods of testing and grading. The correct methods and the equipment for a modern glue room are touched upon and in the last chapter the question of which glue to use is answered with special reference to the various purposes for which it is employed.

The annual meeting of the Chicago Foundrymen's Club, held at the Hotel Sherman, Chicago, December 23, resulted in the election of L. C. Young, McDowell Foundry Company, president, to succeed James Wood; H. S. Vrooman, vice-president; C. E. Hoyt, secretary-treasurer. New directors, James Wood, secretary Sheffield Foundry Company; O. J. Abell, *The Iron Age;* George Carlin, Elevator Supply Company; William Dank, H. Caldwell & Son Company. A feature of the club's campaign for the next year will be the establishment of a permanent and appropriate place for meeting both for regular and casual occasions. The members of the club were addressed by H. Dejoannis, who described some recent trips through the marvel cave of the Ozarks.

That the new workmen's compensation law is one of several causes operating to make production so expensive as to drive manufacturers out of California altogether was claimed by prominent iron men at the seventh annual banquet of the California Metal Trades Association at the Union League Club, San Francisco, December 6. Henry Kessler, vice-president of the Union Machine Company, and John Scott, a nephew of the founder of the Union Iron Works and a local ship builder, were the speakers to take an aggressive stand against the law, after Col. Harris Weinstock, a member of the Industrial Accident Board, had explained it.

A new alloy has been patented by F. M. Beckert, Niagara Falls, N. Y., consisting of manganese, titanium and silicon. Carbon may also be one of the ingredients in proportions varying from a fraction of 1 per cent. to a sufficient quantity to furnish all or part of the carbon required to recarburize steel. The manganese and titanium together will preferably constitute 50 per cent. of the alloy. It is claimed that the component metals of the alloy diffuse more easily and thoroughly through the steel than in the case of the corresponding ferroalloys.

President R. P. Lamont, of the American Steel Foundries, is thus reported in the Wall Street Journal: "We had to close our Granite City plant owing to the lack of orders, and further curtailment is inevitable unless the railroads resume buying. The outlook for the immediate future is very bad and I see no chance of improvement unless the railroads are allowed to increase their rates."

Arthur G. McKee, Cleveland, Ohio, has taken the contract for installing two 20 x 100 ft. stoves with 9-in. Nelson type of lining and side combustion, in the blast-furnace plant of the Pulaski Iron Company, Pulaski, Va. The contract includes an 8 x 100-ft. draft stack, hot blast, cold blast, gas mains, etc. These stoves will be installed in addition to the present equipment of four stoves.

The William B. Pollock Company, Youngstown, Ohio, builder of steel plate construction, is sending out supplement No. 27 to its general book of views of modern blast furnaces which it has built. This new supplement gives views of the two furnaces built by the company for the Pittsburgh Steel Company, Monessen, Pa.

The Cleveland City Forge & Iron Company, Cleveland, Ohio, has begun the erection of a large addition that will be used for a heat treating plant.

Personal

A. L. Humphrey, vice-president and general manager of the Westinghouse Air Brake Company, Wilmerding, Pa., has been made a director to fill a vacancy caused by the death of H. C. Bughman.

W. S. Stothoff has been appointed sales manager of the Taylor-Wharton Iron & Steel Company, High Bridge, N. J., succeeding George J. Siedler, who has resigned to become vice-president of the Eynon-Evans Mfg. Company, Philadelphia, on January 1.

Warren J. Davis, president Manufacturers' National Bank, Racine, Wis., has resigned, effective January 1, to become treasurer of the J. I. Case Threshing Machine Company. He was elected a director at the December meeting.

Dr. Richard Moldenke, Watchung, N. J., returned from a European trip on the Lusitania last week. In company with Walter Wood, of R. D. Wood & Co., who is still in Europe, Dr. Moldenke was in conference with representatives of other countries on the matter of export specifications for cast-iron pipe and pig iron.

Robert G. Ashman has resigned as vice-president and manager of the New Milford Cold Rolled Steel Company, New Milford, Conn.

S. Rosenzweig, formerly mechanical engineer for the Erie City Iron Works, Erie, Pa., has accepted a position with the York Mfg. Company, York, Pa., as consulting engineer for the steam engine department.

John A. Nichols, superintendent of the open-hearth plant of the Carnegie Steel Company at Clairton, Pa., has been appointed superintendent of the steel plant of Corrigan, McKinney & Co., Cleveland, Ohio. He will assume his new duties January 1.

Lucerne Gridlay, who has had charge of the Lansingville plant of the Republic Iron & Steel Company, has been appointed inspection engineer of that company, a position just created, and will have his headquarters at Youngstown, Ohio.

William J. Niederkorn, sales manager of the Turner Mfg. Company, Port Washington, Wis., has been elected secretary of the company but will continue in charge of sales.

J. F. Landolt, for many years with Berry Brothers, now represents the Moller & Schumann Company, Brooklyn, N. Y., and will make his headquarters in St. Louis, Mo., looking after the company's interests in that city and in southern Illinois, in connection with japans, enamels and varnishes.

Charles S. Hubbard, for some years resident manager of the works of the Ames Shovel & Tool Company at Beaver Falls, Pa., has been appointed director of the Department of Public Safety of Pittsburgh, and will assume his new duties January 1.

T. Coleman Ward, resident manager of Hickman, Williams & Co., Pittsburgh, has gone to Birmingham, Ala., to spend the holidays.

W. W. Williams, district sales manager of the Bourne-Fuller Company, Cleveland, Ohio, with offices in room 2144 Oliver Building, Pittsburgh, has resigned, effective December 15, and is now connected with A. M. Byers & Co., Inc., makers of wrought-iron pipe. He has been succeeded as district sales manager by H. P. Roby, who has been connected with the Pittsburgh office for about seven years.

J. R. Morris, London manager for the Kilbourne & Jacobs Mfg. Company, Columbus, Ohio, is in Columbus on a visit to his family.

A. L. Andrews, president Andrews Steel Company and Newport Rolling Mill Company, Newport, Ky., has gone to his winter home in Florida, where he will remain several months.

Louis Koppenhoefer has resigned as secretary and purchasing agent of Wm. Wharton, Jr., & Co. and the Philadelphia Roll & Machine Company, Philadelphia, Pa., subsidiaries of the Taylor-Wharton Iron & Steel Company. In addition to his duties as purchasing agent, he was in charge of the work of the traffic department. With the close of this year he will have seen 30 years of continuous service with the Wharton-Samuel interests.

J. B. Sunderland severs his connections January 1 with the British Columbia Electric Railway Company, Ltd., to take charge of the agency department of Macdonald, Marpole & Co., Vancouver, and will give his attention to the extension and development of this branch of the firm's business. This policy has been decided upon in view of the rapid growth of Vancouver and British Columbia and the probable increased development resulting from the opening of the Panama Canal.

Obituary

HOYT H. GREEN, president Green Car Wheel Company, St. Louis, died December 17 at the home of his daughter in Cleveland, Ohio, aged 77 years. He was born at Colerain, Mass. His first work was with the Cleveland foundry of George W. Sizer & Son and he was later with the Mowry Car Wheel Company, Cincinnati. He removed to St. Louis in 1856, and with his brother, D. P. Green, founded what is now the Green Car Wheel Company. He was also president of the American Hardwood Lumber Company and of the Williams Patent Crushing & Pulverizing Company. He served in the army during the civil war.

CHARLES A. HAIST, for the past 13 years president of the Keystone Mfg. Company, mechanics' tools, Buffalo, N. Y., died December 16 after a long illness. He leaves a widow, daughter and son.

TIMOTHY CRUICE, president Wisconsin Brass Foundry, Milwaukee, Wis., was accidentally killed at Alton, Ill., on December 15, while boarding a train for Milwaukee. He was 61 years old.

STEPHEN HARRIS HARRINGTON, president and chief owner of the Harrington & King Perforating Company, Chicago, died at his home at Highland Park, Ill., December 20, aged 68 years.

IRA P. CARNES, vice-president Lima Locomotive Corporation, Lima, Ohio, died suddenly December 10 from heart failure caused by acute indigestion, aged 63 years.

SAMUEL F. HOUSTON, treasurer of the D. Wilcox Mfg. Company, Mechanicsburg, Pa., died December 8.

Labor Legislation Meeting in Washington

The American Association for Labor Legislation will hold its seventh annual meeting in Washington, D. C., at the Shoreham Hotel, on December 30 and 31. On the afternoon of Tuesday is to be taken up administration and industrial relations, with Secretary of Labor Wilson as presiding officer. Papers are announced by Frank P. Walsh, chairman Federal Industrial Relations Commission, on "The Federal Industrial Relations Commission;" and by Charles H. Crownhart, chairman Wisconsin Industrial Commission, on "Labor Law Enforcement through Administrative Orders." A session on Tuesday evening is a joint one with the American Political Science Association.

On Wednesday morning is to be discussed sickness insurance with the following papers: "The Practicability of Compulsory Sickness Insurance in America," by Joseph P. Chamberlain, Legislative Drafting Association, New York; "Sickness Benefit Funds, Among Factory Employees," by W. L. Chandler, Dodge Mfg. Company, Mishawaka, Ind., and "Trade Union Sickness Insurance," by James M. Lynch, New York State Commissioner of Labor.

On Wednesday afternoon "Working Hours in Continuous Industries" is the subject, and among the papers is one by Basil M. Manly, special agent, United States Bureau of Labor, in investigation of conditions of employment in the iron and steel industry on "Work Periods in Continuous Day and Night Occupations."

The Alan Wood Iron & Steel Company closed its steel mill at Joy Rock, Pa., indefinitely December 20, and its sheet mills at Conshohocken, Pa., for about two weeks. One blast furnace at Swedeland, Pa., remains in operation on basic pig iron, the product being stocked.

The Hyman-Michaels Company, dealer in old material, Peoples Gas Building, Chicago, has sold 300 tons of 80-lb. rails for use in the construction of the vaults of the subtreasury building at San Francisco.

Pittsburgh and Valleys Business Notes

The Ohio Iron & Steel Company, operating Mary furnace at Lowellville, Ohio, paid out between $7000 and $8000 in bonuses to its employees last week. About 100 shared in the distribution, which was paid on a 5 per cent. basis on earnings for the past year. This is the second bonus thus paid.

For some time the Youngstown Iron & Steel Company, Youngstown, Ohio, manufacturer of black and galvanized sheets and formed roofing and pressed metal specialties, has had under contemplation the building of an open-hearth steel plant to supply its own sheet bars. The matter will not be definitely decided until some time in the new year.

The report that the Weirton plant of the Phillips Sheet & Tin Plate Company, at Weirton, W. Va., had closed for an indefinite period is incorrect. The company states that this plant is running full, although it is not known how long this will continue in view of the unsatisfactory condition of general trade.

The Duquesne Light Company, Pittsburgh, has placed a contract with the Green Engineering Company, Chicago, for the installation of 20 Green patent underfeed stokers in its Brunots Island power plant.

Extensive additions are to be made to the shops of the Bessemer & Lake Erie railroad at Greenville, Pa. These include a new blacksmith shop to cost $41,000 with equipment. Other improvements are to be made later.

The Pittsburgh office of the Babcock & Wilcox Company, Farmers' Bank building, has received an order from the Crucible Steel Company of America for two 600 hp. Sterling boilers to be installed in the power plant of its La Belle Works, Pittsburgh.

Deforest Salesmen's Conference

The Deforest Sheet & Tin Plate Company, Niles, Ohio, held its annual sales conference December 15 to 20 inclusive. On Friday, December 19, a complimentary entertainment was given at the Niles theater which the employees of the company attended. It consisted of the running of an industrial film, showing the manufacture of steel from iron ore to tin plate. The film was furnished by the Farrell Film Company, Farrell, Pa. At this entertainment the plan of the company to organize among its workmen a "Safety First" department was outlined by Charles W. Martin, general superintendent. The plan is to provide a committee to be elected by the men to inspect departments and make suggestions tending toward the safety of workmen. Monetary rewards are also contemplated for suggestions by the workmen which are accepted by the safety committee. The sales representatives attending the convention were: M. L. Filley, New York City; E. L. Perkins, Boston; George G. Falconer, Jr., Philadelphia; J. K. White, Richmond; William H. Meyst, Chicago; Paul R. Jordon, Indianapolis; H. C. Beckwith, St. Louis; Howard Flinn, Detroit; E. V. Porter, Pittsburgh; A. L. Jones, Buffalo; George A. Thompson, Chicago; R. J. Hutchings, Pensacola, Fla.

The Doehler Die-Casting Company, Court and Ninth streets, Brooklyn, N. Y., corrects a statement made in the issue of *The Iron Age* of December 18. The company will not move its plant from Brooklyn to Toledo, and the question of moving it has never been considered. It is, however, establishing a branch factory in Toledo.

The Pittsburgh Iron & Steel Foundries Company, Midland, Pa., maker of rolls and castings, is arranging to engage in the manufacture of ingot molds. It will use cupola iron and expects to be turning out ingot molds within a short time. It is in the market for cranes and other equipment.

The No. 1 open-hearth plant of the Lukens Iron & Steel Company, Coatesville, Pa., was shut down indefinitely December 20 and the No. 2 plant for a period of one week. The finishing mills are operating irregularly and will be shut down for the holidays December 24.

Navy Projectiles and Armor Plate

The annual report of the Bureau of Ordnance of the Navy Department says four United States firms are now engaged in furnishing armor-piercing projectiles of good quality. It is stated that a small contract for 12-in. projectiles was placed with the Hadfield Steel Foundries Company, Ltd., Sheffield, England, mainly for the purpose of ascertaining the quality of its projectiles as compared with the domestic. The ballistic test under this contract has been made since the close of the fiscal year and was successful. In this connection the report says:

It is the bureau's opinion that an armor-piercing projectile carrying sufficient explosive to detonate and to completely fragment the projectile after penetrating armor is the best possible projectile for the attack of armored vessels, but in order to make such attack with the highest efficiency certainty of penetration must be predicated. Experiments have been conducted with projectiles of foreign manufacture at the naval proving ground with the result that, up to the present time, projectiles of domestic manufacture have given the best results. Experiments with projectiles having large and small cavities loaded with large and small quantities of explosives, and with various forms of heads, have been conducted and have afforded valuable data.

The report says that deliveries of armor plate have been made during the fiscal year 1913 as follows:

Ship	Bethlehem, tons	Carnegie, tons	Midvale, tons	Total tons
New York	2,040	875	237.8	3,152.8
Texas	1,916	304.8	.....	2,220.8
Oklahoma	1,720	166	4,143.01	6,029.01
Nevada	695	397	.....	1,292
Miscellaneous	265	544.4	288	1,097.4
Total	6,836	2,287.2	4,668.81	13,792.01

Contracts for approximately 8000 tons of armor plate required for the Pennsylvania were let during the year, but no deliveries have been made. On the quality of armor plate the report says:

In the last annual report it was stated that neither cemented nor non-cemented armor had shown any marked superiority. While this is true so far as the results of ballistic tests are concerned, the tendency of non-cemented armor to spall has led the bureau to require that all armor furnished under its contracts be of the cemented type.

All heavy armor now being supplied by the domestic manufacturers is of the K. C. type. Plates made by slightly different processes or containing different alloys have been tested from time to time both in this country and abroad, but so far as the bureau is aware none of these has shown any superiority over the K. C. type of armor.

On the subject of the eight-hour law the report says:

The act of Congress approved June 19, 1912, commonly known as the eight-hour law, became effective, so far as the Navy Department was concerned, on August 22, 1912, the date of the approval of the naval act of that year, which provided that the general eight-hour act should be in force as to all contracts authorized by the naval act from and after its passage. The law did not become effective in general until January 1, 1913.

No violations of the act have been reported to the bureau. Prices of some classes of material purchased by the bureau have been increased since the eight-hour law became effective, the contractors stating that the operation of the law increased the cost of production, necessitating an increase of price. The law has not been in operation a sufficient length of time to permit of a positive or intelligent statement as to its ultimate effect on the cost of ordnance material, but it is evident that some increase already made will be permanent.

The report says that the output of the powder plant at Indian Head for the past year was about 1,800,000 lb. of new powder and about 965,000 lb. of reworked powder. Part of the navy powder supply is furnished by the E. I. du Pont de Nemours Powder Company.

The Monitor Controller Company, Baltimore, Md., manufacturer of automatic controllers of all kinds of motor-driven machinery, has removed its Philadelphia office to suite 826 Drexel Building. After January 1 the Boston office will be under the supervision of the Tompkins-Stoddard Company, 77 Franklin street. Mr. Stoddard, the former representative of the Monitor Company, has become associated with Maurice C. Tompkins, a graduate of the Massachusetts Institute of Technology, in forming the Tompkins-Stoddard Company.

The Machinery Markets

The usual quiet of the holiday and the inventory season prevails in all machinery markets, but in many of them the last few days brought a slight improvement and belief is general that January will bring a further betterment in view of the fact that so much business has been deferred until the new year. It is conceded, however, that improved activity will come slowly. The conditions described are all that can be said of New York and Philadelphia. New England manufacturers have felt some betterment, both in sales and new prospects, though general trade is dull. In Cleveland there has been a moderate volume of business, mostly in orders for single machine tools; inquiry is fair and December will probably prove better than November. Cincinnati conditions are quiet, but inventories show that trade has been better than was supposed. Detroit is dull and what inquiries there are are not expected to result in orders until January. In Chicago better sales have been made from warerooms than is usual at this season, but trade is irregular. The metal trades are dull in Milwaukee but improvement is looked for early in the new year. The outlook is regarded as only fair for machine tools, boilers and some other equipment in the Central South, but good business in electrical machinery is in sight. St. Louis is slower, but has more tentative prospects. In Birmingham there has been no increase in buying, but numerous inquiries indicate better things. Texas is quiet, but many plans for new projects are being announced. Trade remains quiet in the Pacific Northwest, although a slight change for the better has been felt. In the San Francisco territory it is difficult to close orders, but more inquiries are coming out and fair business has been done in some lines. In the early spring good business is expected to materialize from plans for improvements which already have been made known.

New York

NEW YORK, December 24, 1913.

The New York market is at low ebb with the usual year-end quiet. Instances of machinery selling are isolated and some of the business is with the understanding that the sales shall not be invoiced until after January 1. Several of the prospects which were expected to materialize this year have been postponed to next year. Because of the amount of business which has been thus deferred in the last few weeks, the trade anticipates a considerable betterment early in 1914, but believes it will come slowly. The jobbing foundries of northern New Jersey have a quiet run of business, but a few of them have detected a slight betterment in the past few days.

The Canadian Billings & Spencer, Ltd., Welland, Ont., is in the market for hand truck equipment for moving drop forgings from one department to another. T. J. Dillon is manager.

The I. B. Kleinert Rubber Company, 721-727 Broadway, New York, is adding a fourth story to one of its manufacturing buildings at College Point, N. Y. The company has three factory buildings at College Point at the present time.

Adam Danner, 464 Bronx River Road, Yonkers, N. Y., has had plans prepared for a foundry and machine shop to be erected early in the spring.

The Durham Duplex Razor Company, 590 Montgomery street, Jersey City, N. J., has completed plans for a four-story L-shaped building, 125 ft. on Baldwin avenue and 130 ft. on High street, to be of reinforced concrete and brick. The company has found its present quarters with 40,000 sq. ft. inadequate. T. C. Sheehan is vice-president.

Bids will be received until January 1, by A. C. Kittredge, engineer, Rochester, New York, for waterworks for Williamson, N. Y., to cost about $70,000.

The Banner Baby Sled Runner Mfg. Company, 222 East Second street, Jamestown, N. Y., has been incorporated to manufacture a sled runner for use on baby carriages. A. Frank Nelson is president and Clayton M. Jones, secretary. The company will establish a small factory.

The Hudson River Box Company, Cohoes, N. Y., has purchased a site for an addition to its box factory, which, however, will not be built until spring. Louis Bourgeious is the principal stockholder.

The Consolidated Water Company, Utica, N. Y., is having plans prepared for a waterworks building, storehouse and offices. R. V. Sherman is president.

The Hornell Electric Company, Hornell, N. Y., has plans in preparation for a one-story power house, 50 x 60 ft., of reinforced concrete and steel. Luther F. Mason is secretary and general manager.

Work has been commenced on the brick factory addition, 50 x 100 ft., three stories, to be erected on Noxon street, Syracuse, by the Henry Schmeer Box Factory at an approximate cost of $25,000.

Contracts will be let early in the spring for the six-story mill addition, 90 x 250 ft., to be erected by McCleary, Wallin & Crouse at Amsterdam, N. Y. The estimated cost is $225,000.

Duncan W. Peck, state superintendent of public works, Capitol, Albany, will receive bids until January 6 for the construction of Erie Barge Canal Terminals in the Erie Basin, Buffalo, including traveling cranes and loading and unloading apparatus.

The United Engineering & Construction Company, 1113 Scofield Building, Cleveland, Ohio, is preparing plans for a municipal waterworks to be constructed by the town of Franklinville, N. Y. The estimated cost is $250,000.

Contracts have been let for erection of a three-story and basement bottling plant, 50 x 186 ft., by the Bartholomew Brewing Company, St. Paul street, Rochester.

Plans have been completed for the one-story manufacturing plant, 50 x 100 ft., which will be built at Olean, N. Y., early in the spring by the Salisbury Ball Bearing Mfg. Company, Jamestown, N. Y.

The Daly Bros. Mfg. Company, Schenectady, N. Y., has been incorporated with a capital stock of $20,000 by William L., Frank A., and John A. Daly, 24 Columbia street, New York City, to manufacture and deal in machinery.

The T. & E. Cumpson Company, Buffalo, has completed plans for the rebuilding of its coffee and spice mills on Carroll street, which were recently destroyed by fire.

Frederick and Allen Schnell, William Mittling and C. L. Bullymore, Buffalo, have incorporated the Schnell Bronze Bearing Company, and will equip a plant for casting and finishing.

The Buffalo Cement Company, Main and Amherst streets, Buffalo, has commenced construction on a bakery building, 98 x 115 ft., of brick and steel, at Fillmore avenue and Main street, which it will erect and equip for the F. L. Hall Company, the lessee.

The Herr Mfg. Company, Buffalo, N. Y., has leased quarters at 1462 Main street, and will manufacture a composition leather fillet. H. C. Herr is president, John Herr is vice-president and H. E. Herr, secretary-treasurer.

New England

BOSTON, MASS., December 23, 1913.

The machine tool business is probably showing an increase. From several important companies comes the private information that conditions are improving tangibly, sometimes in the way of orders, in other cases in new prospects. General trade is dull. The chief source of interest is the question whether the tide has turned toward better business. It should not be lost sight of that many works which use metal working machinery are not suffering to anywhere near the same extent as the builders of their equipment. In some lines profitable activity is very apparent.

The machinery builders who are not busy are taking advantage of the lull by concentrating their energies upon improvements in the design of their product and upon such changes in their shops as may be accomplished without extraordinary expenditure of money. Few high-class mechanics have been laid off. Even where trade is dullest, a strong nucleus of skilled men has been retained, ready to build upon the moment the new demand begins.

An unconfirmed press dispatch from Waterbury, Conn., under date of December 22, has significance: "The Scovill Mfg. Company in this city, the largest single brass concern outside the American Brass Company, has just increased its working week from 40 to 60 hours, and up and down the Naugatuck Valley the plants of the American Brass Company are working full time. At Thomaston the Seth Thomas Clock Company is putting on extra men. The same condition prevails in the hosiery, cutlery and pin plants in Winsted. Even the rubber factories of the United States Rubber Company in Naugatuck, and the independent concerns in Beacon Falls, are operating on full time, though their storerooms are well filled." Even though the statement may contain some exaggeration, it is probably true in a general way, from what is heard from other sources.

The Universal Winding Machine Company, Providence, R. I., manufacturer of winding machines used in the textile industry, has purchased the Maxwell-Briscoe plant at Auburn, R. I., which town is becoming a rather important manufacturing center, in which the metal industry plays an important part. These works were, until a year ago, actively engaged in automobile building. The new owner will remove its business from Providence to Auburn, where much larger quarters are available for a growing industry. The property comprises some 12 acres of land, with 21 buildings of modern construction. A frontage on the Pawtuxet River at the main line of the New York, New Haven & Hartford Railroad, affords ample shipping facilities.

The Maxwell Company has decided to sell its large works at Hartford, Conn., built for and until recently occupied by the Columbia Motor Car Company.

The contract has been awarded for the new factory building of the Kerite Insulated Wire Company, Seyhour, Conn., which will cost $50,000.

A seven-story industrial building will be erected at Main and Bedford streets, Cambridge, Mass.

The Attleboro Mfg. Company, Attleboro, Mass., has begun the building of an addition to its factory.

The plant of the E. Cottle Leather Company, Woburn, Mass., was destroyed by fire, December 16, with a loss of $250,000.

The Nashua Mfg. Company, Nashua, N. H., textiles, will build an addition to its main mill, 100 x 150 ft., five stories, and 17,000 spindles will be added immediately upon its completion. Lunn & Sweet, Auburn, Maine, shoe manufacturers, will erect a group of four buildings, which will give an additional capacity of 10,000 pairs of shoes per day. S. Slater & Sons, Inc., Webster, Mass., textiles, has awarded the contract for two new buildings, to cost $150,000.

Philadelphia

PHILADELPHIA, PA., December 22, 1913.

The usual shrinkage in business, due to the holidays and the approaching year end, is generally reported. Probably buyers are giving more attention to preparations for annual inventories than to considering new purchases and the trade looks for quiet conditions until about the middle of January. Current buying has been light and confined mostly to the closing of old single tool negotiations. Holiday suspensions, owing to quiet general conditions, promise to be more extended than last year. Recent reports are to the effect that working forces at railroad repair shops are being steadily decreased. Business in second-hand tools and power equipment has been comparatively quiet. Some spotty improvement in the activity of steel casting plants is reported but gray-iron foundries are finding the demand easier.

Claude S. Adams is preparing plans and specifications for a concrete fire-proof factory building to be erected at Camden, N. J., for the General Gas Mantle Company. Details are not yet available.

Samuel D. Clyde and C. D. Alleson, receivers for the A. P. Witteman Company, Chester, Pa., will offer the plant and equipment for sale at auction on January 15. In addition to the buildings the property includes a full modern mechanical equipment for the manufacture and finishing of steel forgings, particularly of the heavier types. Catalogues may be obtained on application to the receivers, Chester, Pa.

A permit has been issued for the erection of a one-story brick garage and repair shop, 119 x 137 ft., on Thirty-third street below Oxford street, for David Grant.

John Moliter is preparing plans, it is stated, for a five-story reinforced concrete factory building 100 x 125 ft., to be erected in Germantown. Particulars are withheld at this time.

Bids will be received by the County Commissioner, Philadelphia, Pa., until December 31, for a pump and motor.

Howard Small and Alexander Boyd, receivers, will sell the real estate, machinery, good will, etc., of the Keller Mfg. Company, Twenty-first and Clearfield streets, on January 16. The property includes a machine shop, power plant, electrical plant and general equipment for the manufacture of vacuum cleaners. The plant is modernly equipped. Efforts will be made to sell the property as a going concern. Catalogues may be obtained from Freeman & Co., auctioneers.

A number of contractors are estimating on plans and specifications for a power house and mechanical equipment to be erected at Byberry Farms, a suburb of Philadelphia, for the Philadelphia Institute for the Feeble Minded. Bids will be opened December 29.

It is reported that the Walsh Plow Company, recently incorporated, with a capital stock of $50,000, will erect a manufacturing plant at Salem, N. J. Definite information is lacking.

T. J. Letzelman, engineer, Williamsport, Pa., is preparing plans for a factory building, 110 x 114 ft., and one, 36 x 72 ft., to be erected in that city.

Bids will be taken at an early date by Joseph B. Bronbaugh, engineer, Wilkes Barre, Pa., for a concrete and brick power house, together with equipment, for the Eureka Power & Light Company.

The Waynesboro Metal & Poultry Company, Waynesboro, Pa., manufacturer of brass and bronze castings, etc., is erecting an addition, 43 x 60 ft., to its present plant, in which it will install a smelter and a reverberatory furnace for reclaiming and refining its own brass ingots.

Chicago

CHICAGO, ILL., December 22, 1913.

Dealers' sales from their floors at Chicago in the past week were considerably above the average of recent months and purchases of tools in one day totaling $15,000 are noted. Business is not sustained in character, however, and what is placed one week is offset by what fails to materialize in the week following. Manufacturers of machine tools are operating their plants at a rate far below capacity, with few exceptions, a condition to which the dullness of the railroads and the automobile industry contributes in large measure. Prices show the influence of this anxiety for business.

The Bullock Tractor Company, Chicago, has been organized with a capital stock of $100,000 to manufacture tractor engines and other machinery, by Henry E. Bullock, 541 Deming place, James E. Bullock and William O. Wayman.

The Northwestern Foundry Company, Chicago, organized in the office of C. L. Sents, 140 South Dearborn street, for the purpose of operating a foundry and machine shop, has been incorporated with a capital stock of $100,000.

The American Metal Molding Company, Chicago, organized by R. L. Parkinson, 234 South La Salle street, Clifford W. Snyder and E. G. Fasset, and incorporated with a capital stock of $100,000, will manufacture metal trim and interior finish.

The American Steel Window Company, Chicago, has been incorporated with a capital stock of $2500. The company may be addressed care of E. M. Ashcraft, 108 South La Salle street.

The Lewis Differential Company, Chicago, has been organized with a capital stock of $25,000 to engage in general manufacturing by Frank M. Lewis, 2030 West Harrison street, F. S. Lewis and Roy Lewis.

A. Bartlestein, 820 West Twelfth street, Chicago, will build a public one-story garage on Ogden avenue, near California avenue, to be 56 x 125 ft., and to cost $6000.

E. W. Johnson, 6538 La Fayette avenue, Chicago, and F. L. Johnson have taken out a permit to build a one-story garage, 50 x 120 ft., to be erected at 7526 Cottage Grove avenue.

The Binder Frame Mfg. Company, Chicago, has been incorporated with a capital stock of $10,000 to manufacture mouldings and picture frames. The company may be addressed in care of U. S. Schwartz, 111 West Monroe street.

The Lucas Electrical Device Company, Chicago, has been incorporated with a capital stock of $10,000 to manufacture electrical machinery and appliances. The company may be addressed in care of Mellen C. Martin, 4525 Vincennes avenue.

The Abbott Light & Power Company, Petersburg, Ill., has been incorporated with a capital stock of $300,000 by Richard H., Ira R. and A. E. Abbott for the installation of public utilities.

The O. F. Jordan Company, East Chicago, Ind., has been incorporated with $150,000 capital stock, to manufacture machinery. J. H. Cummings, Jr., C. Y. Freeman and F. H. Wickett, of Chicago, are the directors.

The W. L. Eskew Lumber Company, Benton, Ill., has been incorporated with a capital stock of $15,000 by J. A. Sommers, Carl Burkhart and C. H. Miller and will equip a planing mill.

An ordinance has been passed at Springfield, Ill., providing for the purchase of a generator and boiler for the plant at Tenth and Reynolds streets.

The Superior Machine Company, Sterling, Ill., has been incorporated with a capital stock of $35,000 to manufacture washing machines by A. B. Cooling, W. A. Cooling, P. W. Dillon and George Becker.

The Stafford Mfg. Company, Paxton, Ill., manufacturer of furniture, plans to increase its capacity by the erection of an addition, 50 x 100 ft.

The Danville Street Railway & Light Company, Danville, Ill., has plans for the expenditure of $250,000 in the improvement of its system and equipment.

The Getz Power Washer Company, Morton, Ill., has been incorporated with a capital stock of $25,000 to manufacture washing machines by John B. Getz, George T. Bean and Hiram E. Todd.

The Malleable Iron Castings Company, Galesburg, Ill., whose foundry was destroyed by fire early in November, has erected a new plant larger by 20 per cent. than the old building. New equipment is required.

Bids will be received by the Fuller Coult Company, engineer, St. Louis, Mo., until January 6, for a waterworks system for Winchester, Ill.

The Barry Mfg. Company, Muscatine, Iowa, has added to its shops a reinforced concrete building costing $15,000 which will permit of an expansion of the foundry and tempering departments.

The Nelson Mfg. & Supply Company, Hutchinson, Kan., is erecting a brass foundry and a pipe and fitting shop.

Milwaukee

MILWAUKEE, WIS., December 22, 1913.

Stagnation briefly summarizes conditions in the metal-working industries and little business is expected before January. Operations for the next 10 days will be very much curtailed and the time spent in inventory and overhauling in preparation for business expected in the coming year.

Louis G. Widule, county clerk, Milwaukee, will receive bids until January 15 for th construction and installation of an electric light and power, heating and ventilating system in the Milwaukee County Tuberculosis Sanatorium at Wauwatosa, work on which has just been started. The sanatorium will cost $600,000 complete. Robert Messmer & Co., Majestic Building, Milwaukee, are the architects.

The Milwaukee Printers' Roller Company, 372-376 Milwaukee street, Milwaukee, has purchased a site at Greenbush and Florida streets and will erect a two-story factory, 50 x 140 ft. Charles S. Utz is president.

The Bradley & Metcalf Company, boot and shoe manufacturer, Milwaukee, will erect early next year a six-story factory, 80 x 100 ft., at Broadway and Erie streets.

The Shue Air Rifle Company has been organized at Milwaukee with $25,000 capital stock, to manufacture air rifles and other pneumatic weapons. Earl V. Shue, inventor and designer, is president. C. M. Hutchinson and A. M. Nehs are also interested.

The Common Council of Milwaukee is considering the construction of a general municipal garage building under the Sixteenth street viaduct, to contain a completely equipped automobile and machine repair shop and to cost from $25,000 to $50,000. Fred G. Simmons is commissioner of public works.

The Pennsylvania Coal & Supply Company, Caswell Block, Milwaukee, will immediately rebuild the coal and building material dock and warehouse at the foot of National avenue, destroyed by fire with a loss of $85,000. The new dock and sheds will be of fireproof construction. Jesse B. Whitnall is president.

The Shadbolt & Boyd Iron Company, Milwaukee, is taking bids for the construction of a large storage warehouse at Wright and Bolton streets, Milwaukee. The building, designed by Charles L. Lesser, architect, will be 130 x 250 ft., two stories, of steel, concrete and brick construction. The company's headquarters are at 129-131 West Water street.

The Board of Supervisors of Waukesha County, Wis., has made appropriations totaling $8500 for the purchase of road-building machinery.

Otto Kuhr, engineer, 154 West Randolph street, Chicago, has been commissioned to prepare plans for the remodeling and construction of additions to the Rahr & Sons Brewing Company's plant at Green Bay, Wis., The estimated cost is $75,000.

Jacobsen & Ackerman, Grand Rapids, Wis., architects and constructing engineers on hydraulic power-plant design, have been awarded the contract to design and construct a 60-ft. dam, power house, pipe line and transmission lines at Willow River Falls for the Burkhardt Milling & Electric Company, Burkhardt, Wis. Purchases of materials will be made after March 1.

Frank Schwalbe & Co., LaCrosse, Wis., were awarded the general contract for building and equipping a $150,000 addition to the plant of the F. Heileman Brewing Company at LaCrosse. The building will be of steel, concrete and brick, 40 x 170 ft., part three and part four stories.

The Board of Education of Racine, Wis., is having estimates prepared for a new central high school building, with manual training department, to be built some time next year. The probable cost will exceed $275,000.

The Kenosha Boiler Works, Kenosha, Wis., have started construction work by day labor on a new boiler shop, 30 x 90 ft., one story, of steel and brick.

The Turner Mfg. Company, Port Washington, Wis., reports that the output of gasoline engines during the month of November, 1913, was 25 per cent. greater than the entire production during the year 1912, and its bookings indicate a sustained production in the same proportion for the next six months.

The Drummond Packing Company, Eau Claire, Wis., will install a 65-ton refrigerating plant of the direct expansion, ammonia type. The estimated cost is $12,000.

The Northwestern Motor Company, organized at Eau Claire, Wis., with $25,000 capital stock by the Rosholt interests, states that its objects are to manufacture and repair general machinery and transact any business connected with a general manufacturing concern. For the present the company will occupy buildings of plant now owned by the Rosholts and will not need any considerable quantity of new equipment.

The Gund Mfg. Company, LaCrosse, Wis., has taken over the established business of the old Vote Beger Company, which is now in bankruptcy.

The A. E. White Machine Works, manufacturer of saws, swage shapers and special tools for mill saws, Eau Claire, Wis., whose incorporation was recently noted, is the new name of a business which has been in operation for the past three years. The company has a shop which it has outgrown and expects to secure larger quarters or build a new shop. Nothing definite will be done, however, before the coming spring. Address A. E. White.

Indianapolis

INDIANAPOLIS, IND., December 22, 1913.

South Bend and Mishawaka, Ind., and Battle Creek, Mich., are being considered as locations for car shops for the Grand Trunk Western Railroad, to replace those recently burned at Port Huron, Mich.

Chicago capitalists are negotiating for the plant of the Eli D. Miller Bed Company, at Evansville, Ind., said to be the largest of its kind in the world. The company went into bankruptcy several months ago.

J. William Whitlock has organized the Rising Sun Chair Company at Rising Sun, Ind., with $25,000 capital stock. A building has been secured which will be remodeled and equipped for the manufacture of chairs.

T. W. Wright and his son, George, of Anderson, Ind., will manufacture iron fence posts, sheet steel cattle guards and other articles of sheet steel, the invention of the elder Wright. They will use one of the floors of the plant of the Wright Rich Cut Glass Company, in which they are interested.

The Phantoscope Mfg. Company, recently incorporated with $100,000 capital stock, will have a plant at Richmond, Ind., and will manufacture moving picture machines. A. F. Jenkins, of Richmond, is one of the promoters.

The new factory of the Smith Hoe Company,

Evansville, Ind., which takes the place of the plant burned, has begun operations. Additional machinery will be required after the new year.

The Indiana Fibre Products Company, Marion, Ind., has been incorporated with $50,000 capital stock to manufacture paper and fiber products. J. L. McCulloch, George A. Bell and A. McBell are the directors.

Detroit

DETROIT, MICH., December 22, 1913.

The approach of the holiday season is evidenced by a continued quiet in almost all lines of the machinery trade. New business has been extremely light. There are some inquiries before the trade from different manufacturing sources, but there is no indication that these will be closed until after the first of the year. Local banks are making loans with a fairly liberal hand and apparently are not pessimistic as to the future. Second-hand machinery is moving slowly and the demand for castings is becoming lighter. Construction work, aided by the favorable weather, is progressing steadily, but new projects are of little individual importance.

The J. H. Thompson Auto Company, Detroit, dealer in automobile trucks, is completing plans for a service station to contain about 50,000 sq. ft. with a complete repair shop in connection.

The Timken-Detroit Axle Company, Detroit, will, it is reported, erect a large addition to its plant at Fort street and Clark avenue.

The Long Mfg. Company, Detroit, manufacturer of automobile radiators, has increased its capital stock from $300,000 to $400,000.

The Ross & Young Machine Company, Detroit, has taken out a building permit covering the erection of a three-story brick factory building, 68 x 157 ft., at Woodbridge and McDougall streets.

The Koppitz-Melchers Brewing Company, Detroit, has begun the erection of a three-story addition to its brew house. Some special equipment will be installed.

The Swift Cigar Company, Detroit, has awarded the contract for a three-story brick addition to its factory at 588 Gratiot avenue.

The Detroit Axle Company, Detroit, has been incorporated with $50,000 capital stock to manufacture automobile axles and accessories. William Dailey and George W. Weipert are the principal stockholders.

The Safety Fender Company, Detroit, has been incorporated with $10,000 capital stock to manufacture fenders for motor trucks. John A. Bierns and Charles S. Hawkins are the principal stockholders.

The Simplex Specialties Company, Detroit, has been incorporated with a capital stock of $15,000, to manufacture automobile top lifters and other accessories.

The Monroe Body Company, Pontiac, Mich., manufacturer of automobile bodies, has acquired an additional factory building. The addition will be devoted largely to assembly purposes.

The sawmill of the East Jordan Lumber Company, East Jordan, Mich., was destroyed by fire December 18, with a loss of $100,000. Information as to rebuilding is not available.

The Fixit Mfg. Company, Manistee, Mich., has been incorporated by William Leroy, John Anderson and Oscar Nelson, to manufacture a patented metal tire repairer.

The Phillips Metallic Hose Coupler Company, Jackson, Mich., recently organized, will immediately begin the erection of a large factory at Jackson. Some equipment will be required.

The village of Wakefield, Mich., has voted a $5000 bond issue for the erection of a municipal electric lighting plant.

The Humphrey Company, Kalamazoo, Mich., manufacturer of gas water heaters, has merged with the Ruud Mfg. Company, of Pittsburgh. No enlargement of the factory is contemplated at present.

A municipal waterworks plant will be constructed at Vicksburg, Mich.

The Henry Rowe Mfg. Company, Newaygo, Mich., whose new factory building was recently mentioned, advises that it will buy a few motors, an elevator, boiler and fittings for a factory and dry kiln. Purchases will not be made until spring. Address Henry Rowe.

The D'Arcy Spring Company, Kalamazoo, Mich., advises that it will be interested in suitable woodworking machinery in the near future for manufacturing wood frames for automobile seats and bed bottoms in the new addition recently mentioned.

Cincinnati

CINCINNATI, OHIO, December 22, 1913.

The wind-up of the year, with practically all inventories finished, shows that the machine tool trade was not quite as dull as was supposed. The increased capacity, with the resultant addition to overhead expenses, has been the cause of much complaint. However, it cannot be denied that the past three weeks were very unsatisfactory, as a whole, to the machine tool trade. Orders have fallen off, and practically no business is in sight, with the exception of a few small lists, mostly calling for about three or four tools. This does not include the requisition from the Oregon Short Line, mentioned last week, which is still under negotiation. Export business is very quiet. The jobbing foundries are in need of orders, and are not operating to capacity.

Williams & Schulte, Cincinnati, will require some machinery equipment for a contemplated addition to their box factory on Court street.

The Anti-Frost Stove Company, Cincinnati, has been incorporated with $25,000 capital stock to manufacture heating stoves for greenhouses. Charles M. Egan is one of the principal incorporators. Nothing is yet known as to equipment requirements.

J. F. Dietz & Co., Cincinnati, desk manufacturers, are moving from their old location on Third street into the large plant at Winton place, formerly occupied by the Schacht Motor Car Company. Additional woodworking equipment will be installed.

It is rumored that the J. P. Baker Box Company, Cincinnati, has tentative plans under way for an addition to its factory on McLean avenue.

The Paragon Refining Company, whose headquarters are at Toledo, Ohio, will build a branch plant in Cincinnati. A number of oil tanks will be erected.

The Progress Lithographing Company, Cincinnati, will make some extensive additions to its plant on York street, and will probably be in the market soon for a number of small electric motors and other equipment.

The municipality of Frankfort, Ohio, contemplates the erection of a waterworks plant. N. M. Coyner is mayor.

The Portsmouth Engine Company, Portsmouth, Ohio, has increased its capital stock from $30,000 to $60,000 and will probably make some additions to its plant in the spring.

The Columbus Varnish Company, Columbus, Ohio, will erect an additional building early in the spring. Nothing is known as to equipment details.

E. W. Mineer is erecting a factory for making concrete blocks and concrete bricks, at Sixth and Water streets, South Warwood, W. Va.

Cleveland

CLEVELAND, OHIO, December 23, 1913.

A moderate volume of business, mostly in single tool orders, is coming out, and a fair volume of inquiry appeared this past week. Among the new inquiries is one from a Cleveland plant for a boring mill, a shaper, a 20-in. upright and a radial drill, and an 18, a 24 and a 26-in. lathe. Taking the month as a whole, December business has been slightly better than that of November. With the holiday season on, little activity is expected during the remainder of the year. Considerable business is in prospect throughout the Central West, but whether much of this will be placed early in the year is problematical, depending on the business outlook at that time. Demand in the foundry trade is dull.

The Cleveland Wrought Washer Company, Cleveland, has under erection and nearly completed a new one-story plant, 80 x 100 ft. This company has just increased its capital stock from $35,000 to $70,000 to provide additional capital needed for its enlarged business.

A six-story storage building equipped with refrigeration plant will be built in Cleveland by the A. R. Dunlap, Jr., Company. Plans are being prepared by the Forest City Engineering Company.

The city of Cleveland will receive bids until January 7 for economizers, fans and other equipment for the municipal lighting plant.

The Atlas Foundry Company, Cleveland, has been incorporated with a capital stock of $10,000 by R. B. Pierce, C. W. Johnson and others.

The Silent American Motor Company, Toledo, Ohio, has been incorporated with a capital stock of $10,000. The company will experiment with a newly patented noiseless motor and if this experiment proves successful it is stated that a large manufacturing plant will be

built. Charles S. Turner is president of the company and J. R. Ford is secretary.

The Templet Company, Ashtabula, Ohio, recently incorporated with a capital stock of $20,000, has taken over the plant of the Grant Fence Company. It will manufacture templets for structural iron and bridge work. H. B. Ash will be manager and G. B. Hoyt will have charge of the sales department.

The Diamond Foundry Company, Akron, Ohio, will shortly begin the erection of a new foundry, which it expects to have in operation in February. The company will make a specialty of rubber molds and parts for rubber-working machinery. Emil Krill is at the head of the company, which has been incorporated with a capital stock of $30,000.

C. E. Martin & Brothers, Mansfield, Ohio, have purchased a new site on which they will build a plant to provide greater capacity than they have at present. The company manufactures culvert pipe and culvert forms, grain tanks and other products.

The Clauss Shear Works, Fremont, Ohio, has commenced the erection of a factory addition. Some new hammers and other machinery will be installed. The company will make various parts that heretofore have been imported.

The Toledo Pipe Threading Machine Company, Toledo, Ohio, reports that its business up to December was equal in volume to that during the corresponding period of 1912, which was a record-breaking year, and it expects its sales during the entire year to slightly exceed those of last year.

A two-story brick shoe factory will be erected by the Cooper-Freidell Electric Shoe Company, Findlay, Ohio.

The Consolidated Mfg. Company, Toledo, Ohio, has completed a 50 x 80-ft. addition to its plant to provide more room for its tubing department. It has added to its products the manufacture of a line of polished tubing.

The Warren City Tank & Boiler Company, Warren, Ohio, will shortly receive bids for the erection of a new plant. This company's plant was burned last spring and since then it has been occupying a temporary plant on the same site. The new plant will include several buildings and be considerably larger than the one burned.

The Suspension Roller Bearing Company, Sandusky, Ohio, will be reorganized early in the year. E. A. Boyer has resigned as secretary-treasurer and other officers will probably retire.

The Central South

LOUISVILLE, KY., December 22, 1913.

While builders of machine tools, boilers and other equipment regard prospects for the immediate future as indicating only fair trade, manufacturers of electrical machinery are sanguine over the outlook. Most of their business is coming through the installation of electric light plants in country towns all over the Central South, this work being affected little, apparently, by the tight money market and the uncertainty which exists in many departments of general business. The demand for machine tools is reported by firms which sell largely to the automobile trade to have fallen off sharply, many of the motor car factories having cut down their production. Ice machinery business has picked up somewhat during the past week, but the situation is still below normal. The number of new industrial enterprises is not large.

The Grocers' Biscuit Company, Louisville, will install motor-driven wrapping and conveying equipment in a plant which it is to erect for the manufacture of package goods.

The Kentucky Distilleries & Warehouse Company, Louisville, suffered $20,000 loss by fire through the destruction of the bottling department in its Anderson-Nelson distillery in Louisville last week. The equipment will probably be replaced.

The Lexington-Street Brewery, Louisville, is planning the erection of a $4000 addition to its plant. The exact nature of the equipment to be installed has not been determined.

The W. P. Brown & Sons Lumber Company, Louisville, is planning the installation of planing-mill equipment at its sawmill at Fayette, Ala. No additional power machinery will be needed.

The Louisville Commercial Club is considering a project for the establishment of a public abattoir in this city. W. E. Morrow is secretary.

The Lanham Hardwood Flooring Company, Louisville, has decided to electrify its plant and has closed a contract with the James Clark, Jr., Electric Company, Louisville, for the necessary motors. There are 19 of them, ranging in capacity from 3 to 40 hp.

W. H. Flanery, Green Hall, Ky., is planning the establishment of a flour mill. In addition to the special equipment he will need a boiler and engine.

John J. Delker, Henderson, Ky., is one of the organizers of the Evansville Buggy Company, Evansville, Ind., which contemplates the establishment of a factory.

The Williamsburg Water Company, Williamsburg, Ky., has been organized with $25,000 capital stock by A. Gatliff, J. B. Gatliff and N. A. Archer.

The Crystal Ice & Cold Storage Company, Ashland, Ky., which has increased its capitalization from $50,000 to $100,000, is reported to be considering enlarging its plant.

The Dawson Light & Power Company has been organized at Dawson Springs, Ky., with $10,000 capital stock by D. B. Kevil, J. S. Kevil and E. A. Stevens.

John G. Matthews, Barbourville, Ky., will open a large coal mine in Knox County, Ky., in what is known as the Brush Creek field. Power and special equipment will be purchased.

Barbourville, Ky., is planning the establishment of an electric light plant. Address the clerk of the Council.

Irvine, Ky., will sell a franchise for the operation of an electric light system. V. M. Gaines has information regarding the establishment of the proposed plant.

A company is being organized at Nashville, Tenn., with $200,000 capital stock to take over the property of the Tennessee Packing & Stock Yards Corporation and convert it into an ice and cold storage plant. The company plans to build an addition to the present ice factory and install equipment with a daily capacity of 100 tons, as well as enlarge the cold storage facilities of the plant. J. O. Swingley may be addressed.

L. P. Barnes, L. C. Kenton and others, Chattanooga, Tenn., will establish a shoe factory at Chattanooga, Tenn. The daily capacity of the plant will be 100 pairs.

W. A. Kerr, Dayton, Tenn., is planning the establishment of a broom factory. The machines will be motor driven.

Frank Dixon and Walter Elberly, Dayton, Tenn., will establish a plant for the manufacture of wooden boxes.

The Delmarva Light, Heat & Refrigerating Corporation, Chincoteague, Va., is reported to be in the market for a 150-hp. return tubular boiler. Charles F. Warner is manager of the company.

A 20-hp. upright boiler is wanted by the Central Garage, Norfolk, Va. Second-hand equipment will be considered.

The Culpeper Light & Ice Company, Culpeper, Va., will install additional machinery. The equipment to be purchased includes a 150-hp. boiler, Corliss engine, 50-kw. direct-current generator, etc. G. F. Major is the engineer in charge.

An electric light plant may be established at Boyce, Va. J. F. Stinson can give information.

E. M. Geier, A. W. Freeman and others, Canton, N. C., are organizing a company with a capital stock of $50,000 for the establishment of a foundry and machine shop.

The city of Fairmont, N. C., will spend $10,000 in the construction and equipment of an electric light plant.

A power plant with a capacity of 850 hp. will be established by the city of Washington, N. C., for the operation of its electric light system. Gilbert C. White, Charlotte, N. C., has been engaged as consulting engineer.

S. V. Upchurch, Morganton, N. C., will establish a 2500-spindle spinning mill at Valdese, N. C.

C. B. Skipper, president and general manager of the Brevard Cotton Mills, Brevard, N. C., has plans for doubling the capacity of the plant.

H. E. Clay, R. F. Huffman, W. S. Goodnight and others, Hickory, N. C., will soon incorporate the Clay Mfg. Company, for the manufacture of picker sticks and other loom specialties. A plant will be erected at West Hickory.

The Allen Mfg. Company, Pleasant Garden, N. C., has been incorporated with $50,000 capital stock, to manufacture building material. W. C. Tucker is president; C. F. Neelley, vice-president; T. D. Tyson, secretary-treasurer, and W. H. Allen, general manager.

The Abbeville Cotton Mills, Abbeville, S. C., is planning a large increase in the capacity of its plant. It manufactures sheeting. Additional power equipment will probably be needed.

The city of Allendale, S. C., will install an electric lighting system and waterworks at a cost of $25,000. The J. B. McCrary Company, Atlanta, Ga., has the plans.

St. Louis

ST. LOUIS, MO., December 22, 1913.

With the approach of the holidays, and the inventory period under way, a still further slackening of real business in the machine tool market is reported, but this past week a gratifying increase in tentative inquiry has come in, which shows that considerable may be expected after the first of the coming year. It has become evident that capital will be available for extensions and new exterprises when definite evidence of stability of general conditions is apparent. General business in the St. Louis territory is reported good and only the railroad and allied industries are lagging. Collections are satisfactory.

The Wagner Electric Mfg. Company, St. Louis, has begun the construction of an addition to its plant, four stories, 45 by 272 ft., the eighth in its group. It will require a considerable amount of equipment which has not yet been placed.

The Skinner Bros. Mfg. Company, St. Louis, manufacturer of blow pipes, will move into enlarged quarters as soon as a building can be completed. It will add some equipment.

The Trenton Motor Car Company, St. Louis, has been incorporated with a capital stock of $10,000 by Julian L. Nugent, A. F. Becker and others and will install a repair plant in its garage.

The Walter L. Zelnicker Supply Company, St. Louis, is reported in the market for a 30 to 35-ton geared Heisler locomotive.

C. K. Rowland, O. E. Carter and A. P. Wagner have asked a water franchise from the city of East St. Louis, Ill., and are supposed to represent capitalists not yet named. Their offices are in the Third National Bank Building, St. Louis.

The National Motor Car Company, Kansas City, Mo., has been incorporated with a capital stock of $13,000 by H. F. Sundin, H. E. Hunt and L. H. Gaskell, and will install a repair plant in its garage.

The King City Electric & Mfg. Company, King City, Mo., is reported in the market for additional equipment under plans recently noted. Harry V. Forest is in charge.

The Marshfield Electric Company, Marshfield, Mo., is reported to be in the market for additional equipment, including a pumping head, motor-driven, 200 ft., 6-in. hole, forcing 30 feet high. It will also install an ice plant to cost about $6000. John E. Hosmer is president.

W. E. Bunyard, Bonne Terre, Mo., is in the market for electric equipment, including a 30 to 50-kw., three-phase, 2300-volt generator for a plant at Piedmont, Mo.

C. F. Fisher, 1643 Broadway, Kansas City, Mo., will establish a steam laundry, the equipment to involve about $18,000.

J. M. Short, and others, of Kansas City, Mo., have bought a producing mine at Joplin, Mo., and will remodel the mill equipment and add machinery.

The property of the W. A. Laidlaw Wire Company, Kansas City, Mo., has been purchased for $25,000 by the Baker Mfg. Company, which was previously located at Evansville, Wis.

The Consumers' Ice & Fuel Company, Holden, Mo., is equipping a plant of 20-ton compression and 15-ton ice-making capacity and is in the market for the machinery.

The Southwestern Milling Company, Kansas City, Mo., has determined to replace its burned plant with two units, one of 2000 and one of 1000 bbls. per day capacity, and will proceed with the work at once.

The city of Paris, Mo., has plans for the installation of a direct-connected generating unit and two tubular boilers in its electric light plant. George C. Blakey is in charge.

Mechanical equipment of the new Montgomery Ward Building at Kansas City, Mo., to be bought by Henrici, Kent & Lowry, of Kansas City, will include power equipment, coal and ash handling and other apparatus.

The city of Jefferson City, Mo., will expend about $150,000 on an electric light plant under the direction of the mayor.

The Missouri School for the Deaf, Fulton, Mo., will install a complete steam power plant to cost about $9000.

J. T. Moorehead will install a cotton gin at Friendship, Ark., and also a sawmill of 10,000 ft. daily capacity.

The A. C. Ward Electric Company, Beebe, Ark., will increase its equipment and extend its service to a number of surrounding towns.

The municipal water and light commission, Gravette, Ark., has plans for the installation of an electric light plant.

The Standard Lumber Company, Helena, Ark., has been incorporated with a capital stock of $25,000 by A. B. and R. W. Sewell and will install a mill.

The city of Rector, Ark., will install a water and a sewage disposal system. Frank L. Wilcox, St. Louis, is the engineer. J. C. Rogers, A. J. Sides and G. H. Hardin, Rector, are the commissioners in charge.

T. J. Gordon, Eureka Springs, Ark., has plans for the establishment and equipment of a plant to manufacture furniture and incubators, and is in the market for the necessary machinery.

The Pittsburg Gas Company plant at McAlester, Okla., has been sold to the Howe-Corrigan Company, Grand Rapids, Mich., which, it is reported, has plans for remodeling the plant and adding some equipment.

The No-Dusto Corporation, Muskogee, Okla., whose incorporation was recently noted, is reported in the market for transmission machinery for a chemical plant, power sewing machines, power fans, power mixers, dust collectors, etc. W. O. McDaniel is president.

The Pawhuska Ice Company, Pawhuska, Okla., is in the market for pumps, boilers and other equipment in connection with extension plans.

The Bartlesville Water Company, Bartlesville, Okla., has plans for the establishment of reserve supply and the necessary installation of equipment.

The Chandler-Stewart Lumber Company, Boswell, Okla., has been incorporated with a capital stock of $17,000 by George Chandler, C. S. Lynch and S. C. Boswell, and will equip a planing mill.

The North Miami Lumber Company, Miami, Okla., has been incorporated with a capital stock of $15,000 by Lon Edwards, A. R. Botts and J. M. Robards, and will install a mill.

The Crescent Cotton Oil Company, Snyder, Okla., has been incorporated with a capital stock of $50,000 by P. A. Norris, R. K. Wootten and R. E. Montgomery as a reorganization of the Western Cotton Oil Company, and will remodel the equipment and continue operations.

The Ardmore Oil Company, Oklahoma City, Okla., recently incorporated by L. H. Love and others, will increase its capital stock from $20,000 to $70,000 and is in the market for machinery in connection with its operating plans.

The city of Tulsa, Okla., has plans for an electric plant to cost $10,000 to generate power to pump from the city water wells, this being duplicate equipment. L. L. Ballard is the water superintendent.

R. E. Wyndham, Hazlehurst, Miss., will rebuild his gin, recently burned. The new equipment will cost about $5000.

H. T. Warlock, Lamkin, Miss., will re-equip his ginnery, recently burned, at a cost of about $22,000.

The Central Lumber Company, Brookhaven, Miss., will equip a sawmill at once, the capacity of the equipment to be 30,000 ft. daily.

The Dunayin Stave & Cooperage Company will equip a plant at Bay Springs, Miss., of undetermined capacity.

The Stewart Door Mfg. Company, Gulfport, Miss., will equip a plant to manufacture cypress and yellow pine doors.

The City Lumber Company, Magnolia, Miss., will convert its sawmill into a box factory, adding considerable equipment.

The city of Hammond, La., will expend about $18,000 on the extension of its waterworks plant.

Andrew Pusey is reported to have plans for the equipment of a syrup factory at Ponchatoula, La.

The Ko Reo Mfg. Company, New Orleans, La., has been incorporated with a capital stock of $50,000 by Martin S. Kenny, J. C. Holzhauser and Henry W. Nebe, to manufacture cereal coffee.

L. Freeman, Lake Charles, La., will equip a bottling plant at Crowley, La., in the early spring.

The City Council of Shreveport, La., has appropriated $7000 for the purchase of a paving plant to do resurfacing work.

A lubricating oil plant at New Orleans, La., is reported planned by the Galena Oil Company, of Bethlehem, Pa.

Birmingham

BIRMINGHAM, ALA., December 22, 1913.

While actual trading has not increased, machinery dealers report a number of inquiries and a general feeling that business will pick up after the holidays. The organization of a number of new lumber companies with ample capital promises well in that field and a large amount of railroad work in Alabama is expected. Collections continue good and there is a growing demand for light engines on farms. Mining business is poor. Little demand for machine tools is reported.

The Gulf Dry-Dock Company, Mobile, Ala., will rebuild the marine railway plant, recently burned, at an early date. Woodworking and planing equipment will be installed.

The De Soto Brick Company, De Soto, Ala., has been incorporated with a capital stock of $5000 and will establish a brick working plant. J. E. Reagor, A. A. Ray, Birmingham, and Sam North, Morris, Ala., are interested.

John F. Weaver will establish a broom factory at New Decatur, Ala., with a capacity of 50 dozen per day. He will install power machines.

The Interstate Oil & Fertilizer Company plans to establish an ice plant at a cost of $20,000 at Moultrie, Ala.

The Sanitary Barrel Cover Company, Henry Schwarz, president, will be organized at Mobile, Ala., for the purpose of manufacturing mission furniture, etc. Henry Schwarz is president.

The Steel City Ice Company, Ensley, Ala., will build a 50-ton ice plant.

G. O. Tucker & Co. will re-establish the ginnery recently burned at Chipley, Ga.

The city of Leesburg, Ga., will install electric lighting at a cost of $10,000.

The Liebsen Self-Starter Company, Macon, Ga., is planning to build a factory for the manufacture of automobile self-starters.

The Western Wire Bound Package Company, Rome, Ga., has been incorporated with a capital stock of $300,000 and plans to manufacture boxes, crates, etc. J. Shellenberger, L. A. Dean and J. E. Dean are among the incorporators.

The town of Midville, Ga., has voted an issue of $10,000 of bonds for waterworks.

The city of Bartow, Fla., will improve the power plant used for the operation of its electric light system. The Council has authorized the expenditure of $20,000.

The Campbell-Ware Company, architectural woodworker, Jacksonville, Fla., has recently been incorporated and will erect one-story saw-tooth roof buildings, which will be equipped with individually motor-driven machines, supplied by current from the municipal electric plant. A. B. Campbell is president; W. S. Ware, vice-president and treasurer, and A. B. Campbell, Jr., secretary.

The city of Punta Gorda, Fla., has voted an issue of $75,000 of bonds for a waterworks and sewer system.

The Burton-Swartz Cypress Company has been organized at Jacksonville, Fla., and will be incorporated with a capital stock of $1,200,000 by E. G. Swartz, William O'Brien and S. J. Carpenter, who control valuable lumber interests.

Texas

AUSTIN, TEX., December 20, 1913.

With the machinery trade displaying the same quietness that prevails in other industrial and business lines, interest is centered in the prospects for the coming year, which appear unusually bright. Plans are being announced and preparations made for a number of important projects upon which work will be started early in 1914. Electrical development propositions are especially active, in both water power and steam projects. With the cotton crop bringing good prices money is beginning to circulate freely.

The Tyler Traction Company, Tyler, has been incorporated with a capital stock of $70,000 to operate a street railroad system at that place. Daniel Hewitt, T. N. Jones, Lawrence Hewitt, J. W. Fitzgerald and T. B. Butler are the incorporators.

Preliminary construction work on the power plant of the Texas Power & Light Company which will be erected in East Waco has been started. The plant will cost about $1,000,000 and will furnish electrical energy to towns and cities within a radius of 100 miles of Waco. It is expected to have the plant in operation by September 1, 1914. The power house will be built of steel, reinforced concrete and brick.

The Silver Box Factory has been organized at Dallas with a capital stock of $25,000. J. C. Silver, E. C. Stocker and B. M. Burgher are the incorporators.

J. H. Fuertes, of New York City, hydraulic engineer, and consulting engineer of the city of Dallas for its proposed sewage disposal plant, has placed before the city the plans and specifications. A pumping station will be erected and the necessary mains laid leading to the disposal works about three miles south of the city. The pumping station will have three horizontal rotary centrifugal pumps, one handling 4,500,000 gal. to 45-ft. lift, another 7,000,000 gal. to 50-ft. lift, and the third 11,000,000 gal. to 55-ft. lift; an electric generating plant for a minimum of 50 incandescent lights and 12 inclosed arc lights. From the pumping station a 36-in. force main will carry the sewage to the disposal plant. Bids will probably be received in February and construction work started within six months.

The wheel department of the Marshall Car Wheel & Foundry Company's plant at Marshall has resumed operations, after being shut down for several weeks. The plant will make 130 cast-iron carwheels daily.

The Burkburnett Light Company, Burkburnett, has been incorporated with a capital stock of $5400 to construct and operate a lighting plant and system. C. W. Wigham, Ben Schwegler and August Lohefener are the incorporators.

The San Angelo Water, Light & Power Company has just completed improvements to its plant at San Angelo at a cost of $15,000, and is contemplating further enlargement.

A factory for the manufacture of brooms and dusters will be erected at Dalworth Park, near Dallas, by Spikes Brothers, Inc., incorporated with a capital stock of $40,000 by George W., Paul, M. L. and J. E. Spikes.

The Texas Packing Company, Marshall, has been formed with a capital stock of $12,000. The incorporators are J. G. Holsomback, I. P. Bedford and L. M. Wilson.

The Fort Worth-Denton Traction Company, Fort Worth, has been organized with a capital stock of $500,000 to construct and operate an interurban line between Fort Worth and Denton, 30 miles. E. E. Baldridge, N. Harding and Ben O. Smith, of Fort Worth, are the incorporators. It is stated that construction work will be started early in January.

The McNeal Co-operative Canning Company is contemplating the erection of a new canning factory at Douglas, Ariz.

San Francisco

SAN FRANCISCO, CAL., December 18, 1913.

Some machinery dealers say that business for the last week has shown a slightly better tone. It is naturally difficult to close transactions, owing both to the time of year and the scarcity of money, but enough small single-tool orders are booked to prevent complete stagnation, and inquiries from the larger machine shops as well as the garage trade are more numerous than for several weeks. Notwithstanding many unfavorable features, a number of local shops have tentative plans for improvements which they hope to make during the winter or early spring, and dealers are confident that a large proportion of this business will go through. Conditions in some miscellaneous lines are also more promising. There is a good general demand for small power units, motor-driven implements and vehicles for farm use, as well as for creamery equipment. Occasional good-sized contracts are coming out for mining and smelting machinery, and plans are being drawn for some large quarry and crushing outfits. Inquiries for canning and fruit-handling machinery are coming out well. Woodworking machinery, however, continues as dull as before. The industrial outlook is somewhat disturbed by recent State enactments, and the workmen's compensation law, taking effect the first of the year, will add a considerable burden. Many manufacturers are favorably disposed toward this law, though sentiment in the metal trades appears rather hostile. Notwithstanding this and the great difficulty in getting money for large improvements, many minor industries financed by private capital are preparing to proceed with improvements immediately after the first of the year. Many men have been laid off by railroad shops, but this is only temporary.

The municipal railroad list has at last come out and is the largest that has appeared for some time. The city will receive bids until January 7 for a 48-in. Niles carwheel lathe, a 24-in. American lathe, a 19-in. LeBlond lathe, a 14-in. Hendy lathe, a 24-in. Gould & Eberhardt shaper, a 36-in. Bickford radial drill, a 20-in.

Barnes upright drill, a heavy duty hacksaw, a No. 2 Bridgeport combination grinder, a Beaudry power hammer, a Crescent universal woodworker and a 48-in. 300-ton Niles wheel press.

B. J. Smith, representing a number of lines of machine tools, will be associated after January 1 with Fred Ward & Son, dealers in grinding equipment and general shop supplies at First and Howard streets, San Francisco. His present agencies will be continued and a representative stock of all lines will be carried.

The Golden Gate Iron Works, structural steel and ornamental iron worker, is completing a large corrugated iron building on Howard street between Eleventh and Twelfth.

The management of the Mountain Copper Company, a British corporation operating near Keswick, Cal., announces that a concentrating plant will shortly be built, with a capacity of 1250 tons of ore daily. The machinery contracts are to be placed in San Francisco.

The Machinery & Electrical Company, Los Angeles, has leased a warehouse at Phoenix, Ariz., and will put in a large line of heating and ventilating machinery, furnaces, etc.

The Robinson Hardware Company, Gilroy, Cal., manufacturer of irrigation pipe, is preparing to install considerable machinery.

Ed. Reynolds has retired from the partnership operating the Willows Foundry, Willows, Cal., which will be conducted in the future by Charles Rider.

The chief engineer of the San Diego & Arizona Railway announces that a large shop and a 65-acre yard will be located at National City, Cal.

T. A. Hoover and H. G. Persons are preparing to start an automobile spring factory at Fresno, Cal.

W. J. Masterson is preparing to start a marble working plant at Chico, Cal.

The laundry machinery business shows considerable improvement. Galland's Laundry will proceed early in the year with a large concrete addition, contemplated for some time; the Pacific Laundry Machinery Company has sold a good-sized outfit to the Coast Linen Supply Company; the New Process Laundry is preparing to install a new plant, and E. J. Egan, of Fresno, has placed a large order with the Western Laundry Machinery Company.

The city of Los Angeles is taking bids for a ditching machine.

The Imperial Valley Cotton Growers' Exchange, El Centro, Cal., is raising funds for the construction of a ginning plant and oil mill.

The Panama Rubber Company, 507-508 Security Building, Los Angeles, has let contract to the Huntsberger-Reed Company, Los Angeles, for a one-story brick and cement factory, to contain 28,000 sq. ft. of floor space. It will cost when completed and equipped about $125,000. Equipment will be installed to turn out 400 tires a day, and the company will have a rubber reclaiming department to handle three tons of old rubber per day. The company has recently purchased the business of the W. D. Newerf Rubber Company, with two wholesale stores and 53 selling agencies.

The Pacific Northwest

SEATTLE, WASH, December 18, 1913.

Business in the Northwest is quiet although a slight change for the better is noticeable. Several good-sized sales of machinery were reported recently and from indications these will gradually increase. The larger machinery dealers intimate that the year's business for 1913 will be considerably larger than for 1912, as the first eight or nine months' business was exceptionally good. Collections are reported a little better.

Daniel Murray, Seattle, Wash., has let to David Dow the contract for construction of a two-story brick and concrete factory building at Twelfth avenue and Madison street. Motorcycles will be manufactured.

The Washington-Oregon Glass Company, Renton, Wash., has been incorporated with a capital stock of $200,000. T. J. Conway, formerly of Pittsburgh, is president and W. C. McConnell, 213 Marion street, Seattle, secretary. The new company will take over the property of the Renton Glass Company, Renton, and will expend about $5000 in remodeling the plant and installing new machinery.

The Yakima Condensery Company, North Yakima, Wash., recently organized and incorporated, will erect a 50,000 lb. per day milk condensery. Work of construction will begin shortly. Frank Chevalley, North Yakima, is president.

The Perfect Vacuum Can Company, Bellingham, Wash., has been incorporated to promote a vacuum canning machine invented by Adoloh Malmquist, 925 Thirteenth street, Bellingham. A plant for the manufacture of this machine will be built early in the coming year. E. B. Deming is president.

The Pioneer Iron Works, of Olympia, Wash., has been sold to J. Banford, who operates the Globe Iron Works at Tacoma.

It is reported from reliable sources that the Gramm-Bernstein Motor Truck Company, Lima, Ohio, will build a factory in Tacoma, Wash., and that work of construction will begin within six months.

The Washington Water Power Company, Spokane, Wash., has increased its capital stock from $15,000,000 to $20,000,000, the additional $5,000,000 to be used in the construction of a power plant on a site at Long Lake. Power will be supplied to several small towns in the Cœur d'Alene mining district.

The Cœur d'Alene Crescent Mining Company, Spokane, Wash., has been organized by L. W. Bonney, Seattle; J. B. Millspaugh, F. R. Crocker and others, of Spokane. The company will take over the properties of the Evolution Mining Company, Osborn, Idaho, and will begin extensive developments on the property. Among the first installations will be a compressor, which will be placed early in the spring.

C. O. Peterson, Eugene, Ore., owner of the Eugene Excelsior Mill, plans to build a new fireproof mill early in 1914, to cost $10,000.

Z. B. Fox and son, Ray Fox, Cottage Grove, Ore., will erect a furniture factory.

The Pacific Furniture Specialties Mfg. Company, Lumber Exchange building, Portland, Ore., recently incorporated with $100,000 capital stock, will immediately begin the construction of a three-story, mill construction building on a three-acre site located at East Twenty-seventh and Morrison streets, Portland A large amount of machinery will be installed.

The Chandler fruit storage and packing house at Cœur d'Alene, Idaho, was recently destroyed by fire. It is understood that the loss was covered by insurance and that the building will be rebuilt at once.

The Idaho Roofing Company, 330 North Hayes avenue, Pocatello, Idaho, has broken ground for a factory for the manufacture of roofing material. The company will need machinery for rectifying spirits, the development and manufacture of ammoniacal liquor and for the manufacture of tarred felt. Address John E. White.

Eastern Canada

TORONTO, ONT., December 20, 1913.

The Dominion Iron & Steel Company, Sydney, C. B., is making improvements in its mills to meet the anticipated large demand in the immediate future for its products.

G. H. Benson, of the Lally Gold Mining Syndicate, Cobalt, Ont., announced that the mine will have its new plant installed as soon as possible. He also reported that the company may install a five-stamp mill and a cyanide plant this winter.

A fixed assessment of $15,000 was made by the city of Ottawa, Ont., to the United Drug Company of Canada, which will erect a large factory in Ottawa in the near future.

The Nova Scotia Car Works, Halifax, N. S., has received several orders and the plant will start up immediately. The orders given are sufficient to keep the works in operation till the middle of March. Work on the foundation of the new foundry has been finished and the structure will be pushed as fast as possible to completion.

It is announced that the contract for the new factory for the Canada Nail & Wire Company, Ltd., which is to be located at Colbrook, N. B., near the Ford Motor Company's plant, will be awarded as soon as the company has received its charter. The structure will probably be of brick, although concrete is being considered.

The shoe factory of Tourigny & Marois, Quebec, Que., was totally destroyed by fire. The loss is estimated at $80,000, covered by insurance.

The Dominion Textile Company will erect a new mill and make large extensions to its present mill at Montmorency Falls, Que.; the work will be commenced next summer. The new mill will cost in the vicinity of $750,000. Harold F. Mills is the manager.

The Hamilton Oak Tanning Company, Woodstock, Ont., has been purchased by the Canadian Oak Leather Company, which is controlled by Messrs. Thorntons,

Ltd., Brantford, Ont. The plant will be materially enlarged. P. S. Thornton is president. The management of the Woodstock factory will be in charge of A. L. Schultz.

The Solo Player Piano Company, Ltd., Clinton, Ont., has been incorporated with a capital stock of $40,000 by Paul von Kohl, J. J. Hill, John W. Best, Arthur J. Thomson and others, to manufacture player pianos.

The Canadian Elevator Equipment Company, Ltd., Toronto, has been incorporated with a capital stock of $100,000 by George H. Sedgewick, D. McArthur and others, to manufacture elevator accessories.

The Hepworth Silica Pressed Brick Company, Ltd., Hepworth, Ont., has been incorporated with a capital stock of $125,000 by James Douglas, Frank Campbell and others, to manufacture pressed silica brick.

Fogarty Paterson, Ltd., Montreal, has been incorporated with a capital stock of $50,000 by A. Wainwright, M. Alexander and others, to manufacture boots, shoes, rubbers, etc.

The Universal Supplies, Ltd., Montreal, has been incorporated with a capital stock of $20,000 by Henri Lamothe, Joseph L. St. Jacques and others, to manufacture electrical appliances, machinery, etc.

J. R. Baxter & Co., Ltd., Montreal, has been incorporated with a capital stock of $75,000 by John R. Baxter, W. J. W. Booth and others, to manufacture supplies for railroads, steamships, machinists, etc.

The P. L. Schmidt Hardware, Ltd., Montreal, has been incorporated with a capital stock of $50,000 by A. M. Fisher, John Pritchard and others.

The Consumers' Fish & Cold Storage Company, Ltd., Yarmouth, N. S., has been incorporated with a capital stock of $50,000 by E. E. Prior, M. P. Shaw and others, to manufacture ice, etc.

A five-story and basement factory is to be erected at Leamington, Ont., by the Heinz Pickle Company, R. A. Logan, manager. Considerable machinery and equipment will be installed.

The International Specialty Company, Bridgeburgh, Ont., recently incorporated to take over the business of the Edwards-Jackson Prestoline Company, is preparing plans for a manufacturing plant to be erected in the spring.

The Midland Malleable Iron Company, Ltd., Midland, Ont., has let contract to the Rauff Company, Milwaukee, Wis., for the erection of a concrete and brick foundry building, 83 x 503 ft., one story, to cost $115,000. E. J. Vanderboom is the manager.

Plans have been prepared for a two-story machine shop of brick and steel to be erected on Front street, Sarnia, Ont., by Henry Longhead, 125 Front street, who is receiving bids for the building and equipment.

Western Canada

WINNIPEG, MAN., December 19, 1913.

The demand for machinery is quiet in comparison with a year ago. The financial situation seems to be easing, but industrial expansion is almost at a halt. It is expected that trade will improve in the first part of the new year and manufacturers and jobbers are preparing for better business. A steady call for machinery parts is reported, manufacturing plants working practically to capacity and always needing supplies. This has been a season of retrenchment, however, and conservatism appears to be general.

The Alberta Pacific Elevator Company, Ltd., Calgary, Alberta, intends to erect a large number of elevators along some of the newer railway lines in that province next year, and preparations are now being made for the work.

The Ocean Falls Pulp & Paper Company, Ltd., Vancouver, B. C., is reported contemplating the erection of a large paper plant near the one now in operation at Ocean Falls, B. C. The proposition is said to represent an investment of $3,000,000.

Richard Obel, industrial commissioner of Vernon, B. C., has announced that the MacLaren's Laurentia Milk Company will erect a plant at Vernon in the near future.

The Edmonton Iron Works, Edmonton, Alberta, will build a large new foundry in 1914.

The New England Fish Company, Prince Rupert, B. C., will install a cold storage plant in addition to the present plant this winter.

The City Council of Victoria, B. C., has decided to construct the pressure pipe from Humpback reservoir to the city by day labor, and will purchase and operate a plant. This is in connection with the Sooke Lake water project now under way.

Government Purchases

WASHINGTON, D. C., December 18, 1913.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, until December 30, schedule 6120, for a 7½-hp. motor for Brooklyn; until January 6, schedule 6126, for a horizontal boring and milling machine, for Washington; until January 13, schedule 6157, for two motor-driven pressure blowers for Portsmouth, schedule 6150, for a 60-hp. vertical tubular boiler and erection at Philadelphia; schedule 6156, for a 4-ton gantry crane for St. Juliens Creek, Va.

Bids will be received at the office of the commanding officer, Frankford Arsenal, Philadelphia, until December 29, for the installation of one steam turbine generator with exciter and switchboard and condensing equipment in the engine room of the power plant at the Frankford Arsenal. Refer to circular 106, and address the commanding officer, Frankford Arsenal, Philadelphia.

Bids will be received by J. A. Edgerton, purchasing agent, Post Office Department, Washington, D. C., until December 29 for delivering at the mail lock shop, Washington, D. C., one electrically-driven portable drill.

Bids will be received at the Department of Interior, Washington, until January 9, for remodeling the power plant of the Government Hospital for the Insane at Anacostia, D. C., taking in part payment the old machinery now operating. Copies of specifications may be received on application to the chief clerk of the department.

Bids will be received at the office of the United States Engineer, Louisville, Ky., until January 15, for a steel pump boat. Address J. C. Oakes, major, engineers.

Bids were received December 15 by J. E. Kuhn, lieutenant colonel corps of engineers, United States Army, Washington Barracks, D. C., for furnishing ventilating blowers and exhaust fans as follows:

Item 1, 14 ventilating blowers, right-hand; 2, two ventilating blowers, left-hand; 3, 18-in. disc or propeller fans, complete with starter; 4, 18-in., complete with inclosed starting rheostat and main switch. A. H. McKay, item 1, $28 each; 2, $32 each; 3, $63.50 each, 4, $63.50; total $838. B. F. Sturtevant Company, item 1, $29 each; 2, $29 each; 3, $76 each; 4, $102 each; total, $1024.

Bids were received by the purchasing agent, District government, Washington, D. C., December 17 for furnishing two electrically-driven woodturning lathes, not less than 10-in. swing, for public schools, as follows:

National Electrical Supply Company, $300; 30 days. James B. Lambie Company, $277; 35 days. Oliver Machinery Company, $279; 35 days. E. H. Shelton & Co., $208; 21 days. Cary Machinery & Supply Company, $216; 15 days. J. G. Bount, $333.80; 30 days. J. A. Fay & Egan Company, $290; 14 days. Kemp Machinery Company, $189; 45 days. F. A. Branda & Co. (Inc.), $276.75; 40 days. Manning, Maxwell & Moore, $280; 30 days. Tannewitz Works, $250; 60 days.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, December 16, for supplies for the navy yard, as follows:

Schedule 6035—Construction and Repair

Class 2, Puget Sound—Two pumping engines and two fresh-water pumps—Puget Sound Machinery Depot, $2921; Deane Steam Pump Company, $2400, $2520, and $2620; Dow Pump & Diesel Engine Company, $2585.75; Fairbanks, Morse & Co., $2400; Fairbanks, Morse & Co., $2488.

Schedule 6036—Construction and Repair

Class 3, Puget Sound—One combined hand-operated windlass—American Engine Company, $345; Hyde Windlass Company, $350.

Class 3, Alternate—F.o.b. works—American Engine Company, $300.

Schedule 6066—Construction and Repair

Class 72, Brooklyn—One universal milling machine, with fittings, attachment and tools—Brown & Sharpe Mfg. Company, $1296.49; Frevert Machinery Company, $1296; Manning, Maxwell & Moore, $1317.10; Niles-Bement-Pond Company, $1355.65, part; Oesterlein Machine Company, $1290.13; Prentiss Tool & Supply Company, $1295.47.

Class 73, Brooklyn—One universal and tool grinding machine with 10 sets of spare grinding wheels—Brown & Sharpe Mfg. Company, $826.50 and $538; Manning, Maxwell & Moore, $815 and $675; Niles-Bement-Pond Company, $430; Oesterlein Machine Company, $553.60; Prentiss Tool & Supply Company, $863 and $830.

Schedule 6076—Steam Engineering

Class 121, Brooklyn—One electrically-driven engraving machine—George Garton Machine Company, $600; Frederick Jaeger, $690; Manning, Maxwell & Moore, $600 and $680.

Schedule 6075—Construction and Repair

Class 115, Brooklyn—One bench and fitting shears combined—R. W. Geldart, $12; Kemp Machinery Company, $121; Manufacturers' Agency & Sales Company, $110; Merchants & Evans Company, $117.60; Manhattan Supply Company, $117.60.

Schedule 6041—Construction and Repair.

Class 32, Puget Sound—Two electrically-driven ventilating fans—Diehl Mfg. Company, $410; General Electric Company, $462.50; B. F. Sturtevant Company, $362.25.

Schedule 6044—Steam Engineering

Class 43, Mare Island—One fuel-oil heater and one spare coil—Griscom-Russell Company, $388; Schutte & Koerting, $415.

Class 43, Alternate—F.o.b. works—Griscom-Russell Company, $353; Schutte & Koerting, $415.

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